THE ANATOMY OF THE ARTERIES OF THE HUMAN BODY.

THE

ATOMY OF THE ARTERIES

OF

THE HUMAN BODY

AND ITS APPLICATIONS TO PATHOLOGY AND OPERATIVE SURGERY

WITH

A SERIES OF LITHOGRAPHIC DRAWINGS

BY

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THE DRAWINGS FROM NATURE AND ON STONE

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LONDON

PRINTED FOR TAYLOR AND WALTON

BOOKSELLERS AND PUBLISHERS TO UNIVERSITY COLLEGE

UPPER GOWER STREET

MDCCCXLIV.

LONDON:
BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.

PREFACE.

Several years have elapsed since I became impressed with the belief that the difficulties which have often occurred in the performance of those surgical operations in which the larger arteries are concerned, have arisen in great part from want of sufficient acquaintance with the differences in anatomical disposition to which these vessels are subject—not merely the deviations in the origin of large branches, which are usually named varieties, but other peculiarities of various kinds which are liable to occur, such as those which affect the length, position, or direction of the vessels. Under that impression I was led to observe these circumstances more closely, and finally determined to obtain a record of the condition, whatever it might be, of the more important vessels in a considerable number of cases.

With this view, I examined with more or less attention the bodies which were received during a series of years for the study of anatomy into the School of Medicine in University College. These bodies, to the number of 1040, were, with rare exceptions, so inspected with reference to the subject of my inquiries, that anything very unusual could not escape notice; and, in order to insure accuracy, when other occupations allowed, the arteries were carefully examined and their condition noted at the time,—attention being always particularly directed to those vessels and to the points in their history which seemed to be of importance in the practice of surgery.

This detailed investigation was continued until the number of cases observed appeared such as would afford grounds for fixing what should be considered the most frequent or standard conformation of the vessels, and for forming at the same

time reasonable conclusions both as to the limits of the deviations from that standard and the relative frequency of their occurrence.

While the observations thus made were written down, drawings were obtained of all the important peculiarities which presented themselves, and when it was practicable the preparations were preserved.

The varieties in the arrangement of the blood-vessels thus noted grew, as may be supposed, to be very numerous; but instead of difficulties multiplying with the number of observations, it was usually found that as the facts accumulated, the transition from one state to a very different one ceased to be abrupt or without method, for others from time to time interposed which served to link them together.

Originally these observations were intended exclusively for the benefit of my class; but as their number and connexion seemed likely to render them more extensively useful, I resolved to publish them. On examining with a view to publication the materials which I had collected, it became obvious that their utility would be very limited, unless as a part of a full history of the arteries with adequate delineations. In consequence, a series of drawings, showing the arteries according to their usual arrangement, has been prepared, and to these are appended the observations previously alluded to. The work has thus grown under my hands, and has gradually assumed its present form.

To carry out my views as to the delineations, I obtained the assistance of my friend and former pupil, Mr. Joseph Maclise. In reference to that gentleman's labours, it may be allowed me to say, that while I have had the co-operation of an anatomist and surgeon, obviously a great advantage, the drawings will, I believe, be found not to have lost in spirit or effect. It affords me much gratification to render my acknowledgments to Mr. Maclise, for the readiness with which he acceded to my wishes, and undertook so arduous a task, and the zeal with which he has devoted himself to it in the intervals of application to the duties of his profession.

Before I explain the plan pursued in this publication, it may be permitted me to advert shortly to the distinguishing

features of the principal works hitherto published on the Arteries, because it will thus be apparent in what respects this publication differs from others.

The work of Haller *, the first in point of time which deserves notice, and still in many respects the best on the Anatomy of the Arterial System, is characterised by vast learning, by candour in the appreciation of the labours of others, and accurate observation—in short, by those high qualities which distinguish all the writings of that illustrious author. The written descriptions, especially those of the branches, have perhaps never been equalled for copiousness and accuracy. But the drawings were in many instances taken from the bodies of very young children; and the treatise altogether is deficient in systematic arrangement and continuity, probably in consequence of the desultory manner of its preparation, and the length of time which intervened between the publication of its parts. On the whole, though not suited to general use, the "Icones Anatomicæ" are, and will continue to be, to the diligent inquirer a most valuable contribution to the history of the arteries.

The representations of the arteries contained in Scarpa's work on Aneurism †, like all the delineations published by the same author, are most carefully and beautifully executed. They comprehend, however, but a small portion of the arterial system, and have obviously been intended to show not so much the position and connexions of the arteries, as the branches by which the circulation was likely to be carried on after an operation for aneurism—an object which the results since obtained in the treatment of aneurism have fully demonstrated to be unnecessary.

Tiedemann ‡ has given, in the "Tabulæ Arteriarum," systematic and clear delineations of the arteries, with many of their so-named varieties. To this valuable work the modern student of anatomy is almost exclusively indebted for representations of the arterial system. In it, however, as in

* Icones Anatomicæ, quibus præcipuæ aliquæ partes Corporis humani delineatæ proponuntur et Arteriarum potissimum historia continetur. Gottingæ 1804.

† Sull' Aneurisma Riflessioni ed Osservazioni Anatomico-chirurgiche. Pavia 1756.

‡ Tabulæ Arteriarum Corporis Humani. Carlsruhæ 1822.

the other treatises referred to, the veins and nerves are not shown in connexion with the arteries, and those modifications or peculiarities of the vessels alluded to at the commencement of these observations are not taken into account.

In the present work the arteries are represented—

1st.—According to their most frequent arrangement, without the accompanying veins.

2ndly.—They are shown in connexion with the larger veins and the nerves.

3rdly.—The deviations from that which has been taken as the standard because the most frequent condition of the arteries, are illustrated in a series of sketches.

4thly.—Such peculiarities of the veins, and occasionally of the nerves and muscles, as appeared likely to be of importance in surgical operations, are represented on a reduced scale.

The letter-press, besides an explanation of the drawings and remarks on them, contains—

A series of Tables, showing, in a considerable number of cases, the condition of the arteries as to some of the points of most importance in their anatomy;

A connected view of their anatomical history,—the details being arranged in systematic order;

And Practical Commentaries: which consist, for the most part, of inferences from the facts previously set forth, and their application in performing surgical operations.

R. Q.

REFERENCE TO THE PLATES AND EXPLANATION.

EXPLANATION OF PLATES.

EXPLANATION OF PLATE I.

The body of which this plate is a representation was placed in the sitting posture, the head thrown back and inclined to the right side, the left arm raised and supported.

The anterior wall of the chest was removed to a greater extent on the left than the right side, the heart and the lungs taken out, some of the muscles of the neck were cut away, viz. the sterno-hyoid, sterno-thyroid, and greater part of the sterno-mastoid. The pectoral muscles are seen to have been divided and their external attachments turned aside. By these means the arch of the aorta, its continuation in the thorax, and its large branches, were exposed.

a Lower maxillary bone.
b Submaxillary gland.
c Digastric muscle.
d Mylo-hyoid, the muscles of opposite sides are seen to join; a lymphatic gland * has been accidentally allowed to remain.
e Os hyoides.
e[1] Hyoglossus muscle.
f Thyroid cartilage.
f[1] Thyro-hyoid muscle.
g Thyroid body.
h Cricoid cartilage, from it are seen diverging upwards to the thyroid cartilage, the crico-thyroid muscles.
i Trachea.
j Pleura.
k Clavicle.
l Sterno-mastoid muscle.
m Anterior scalenus.
n Posterior scalenus.
o Greater pectoral.
p Smaller pectoral.
q Biceps brachialis with coraco-brachialis to its inner side.
r Subscapular.
s Tendon of latissimus dorsi.
s[1] Teres major.
t Serratus magnus.
v Bronchus of left side.
w Œsophagus.
x Sternum.

ARTERIES.

1. Aorta.
2. Coronary.
3. Innominate.
4. Carotid.
5. Subclavian.
6. Beginning of axillary.
7. Internal mammary.
7*. Vertebral.
8. Thyroid axis.
9. Supra-scapular.
10. Superficialis colli.
10*. Posterior scapular.
11. Ascending cervical.
12. The largest of three thoracic branches.
13. Subscapular: from this artery branches are given to each side; the largest, which is directed backwards, is the dorsal artery of the scapula.
14. The origin of the posterior circumflex.
15. Superior-thyroid: from it the laryngeal is directed inwards beneath the thyro-hyoid muscle, and a superficial branch outwards over the carotid artery.
16. Lingual.
17. Facial: this artery, after emerging from the submaxillary gland, is seen to give its submental branch, and then to turn over the maxillary bone.
17*. Occipital.
18. Internal carotid.
19. Left bronchial.
20. Œsophageal: below this is another, which is also an œsophageal branch; it passed behind the œsophagus, and ramified in its substance.

EXPLANATION OF PLATE II.

The body from which this drawing was taken was placed on a chair in the sitting posture; the left fore-arm happened to rest on the arm of the chair.

The plate shows that a considerable part of the anterior wall of the chest has been removed, and the pericardium laid open to expose the heart and the great vessels. The large branches of these are shown in the neck by the removal of a part of the muscles attached to the sternum and clavicle.

a Thyroid cartilage.
b Sterno-hyoid muscle.
c Sterno-thyroid.
d Omo-hyoid.
e Sterno-mastoid.
f Scalenus anticus.
g Thyroid body.
h Trachea.
i Trapezius muscle.
k Clavicle.
l Greater pectoral muscle.
m Pleura.
n Pericardium.

ARTERIES.

1. Aorta.
2. Right coronary.
2[1]. Branch of left coronary.
3. Innominate.
4. Common carotid.
5. Subclavian.
6. Internal mammary. The artery of left side rests on a portion of

pleura, and is cut short. That of the right side has behind it the pleura, from which it is separated at the lower part of the thorax by some fibres of the triangularis sterni. From its outer side are given anterior intercostal branches : inwards are sent two mediastinal arteries ; over the lowest exposed rib is seen a perforating branch. The mammary artery is accompanied below by two veins, by the junction of which is formed the single internal mammary vein.

7. Supra-scapular.
8. Transversalis colli.
9. Pulmonary artery.

VEINS.

10. External jugular of right side. It is joined near the clavicle by the supra-scapular and by the anterior jugular, part of which remains.
11. The anterior jugular, cut. This vein descended superficially to the sterno-hyoid and sterno-thyroid muscles, and crossing outwards beneath the sterno-mastoid, ended with the external jugular in the subclavian.
12. Internal jugular. The vein of the right side receives internally a middle thyroid vein, which is frequently present, though perhaps not usually so ; from without it receives a transverse vein, which comes from beneath the trapezius muscle, and usually ends in the external jugular ; this branch may be regarded as corresponding to the transversalis colli artery. The internal jugular vein of the left side (12) is held aside to expose arterial branches which arise behind it.
13. The subclavian veins seen to join with the internal jugular and form the innominate veins (14) on each side. The innominate veins are unequal in length, and different in direction ; each of these veins receives from above at its commencement the vertebral vein, which is seen to cross the subclavian artery after coming from behind the vagus nerve ; on the right side the vertebral vein escapes from behind, also a portion of the fascia or sheath, which separates the large cervical vessels from the spine. The innominate vein of the right side receives the internal mammary of the same side close to its end ; that of the left side receives from the thyroid body two branches (inferior thyroid), and from below two veins, which are represented cut ; of the latter, the branch next to the junction of the subclavian and internal jugular veins, is the left internal mammary ; that which is nearer to the vena cava, and rests against the origin of the innominate artery, is a mediastinal vein.
15. Vena cava.

NERVES.

16. Vagus. The nerve of the right side sends its recurrent laryngeal branch behind the commencement of the subclavian artery. On the left side the vagus is seen to be directed down over the arch of the aorta, and below this to give two branches. Of these, one (the recurrent laryngeal) turns inwards against the ligamentum arteriosum, which, in consequence of the deep shadow in which the part lay, is indistinctly seen. The lower and smaller branch of the nerve is the anterior pulmonary ; the vagus itself is directed backwards.
17. Phrenic. The nerve of the left side, after entering the chest, lies at a considerably greater depth than the internal mammary artery ; lower down it is seen between the pleura and pericardium, and turning round the point of the heart.
18. The nerves of the brachial plexus.

EXPLANATION OF PLATE III.

The integuments have been turned aside; the platysma-myoides and cervical fascia, with the veins and the nerves, except those of the brachial plexus, are removed from the side of the neck.

a The masseter muscle, covering the inferior maxillary bone; on it a branch of the facial artery is seen to ramify.
b Parotid gland.
c Digastric muscle.
d Stylo-hyoid muscle.
e Submaxillary gland.
f Mylo-hyoid muscle: it is seen to join with the muscle of the opposite side above *g*.
*f** Hyoglossus muscle.
g Hyoid bone.
h Thyroid cartilage.
Omo-hyoid muscle: in this case the tendinous part of the muscle is very small, and is seen only at the upper margin of the muscle, immediately behind the sterno-mastoid.
j Sterno-hyoid muscle.
k Sterno-thyroid muscle.
l Sterno-mastoid muscle.
m Anterior scalenus muscle.
n Posterior scalenus muscle.
o Levator anguli scapulæ.
p Trapezius muscle.
q Clavicle.
r Larger pectoral muscle.
s Deltoid muscle.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid; its hyoid branch is seen to ramify in the muscles attached to the hyoid bone.
5. Lingual: this artery usually makes the curve represented here, before it becomes covered by the hyoglossus muscle.
6. Facial: a branch (lower masseteric) is shown on the masseter muscle; the end of its submental branch is seen on the mylo-hyoid muscle, emerging from under the anterior belly of the digastric.
7. Occipital: a small artery (sterno-mastoid) given off with the occipital, is directed back to the sterno-mastoid muscle.
8. Subclavian.
9. Supra-scapular: a branch of this artery supplies the muscles above the inner end of the clavicle.
10. Superficialis colli.
11. Posterior scapular.

NERVES.

12. Brachial plexus.

The common carotid artery, which in the lower part of the neck is covered by the omo-hyoid, sterno-thyroid, sterno-hyoid, and sterno-cleido mastoid, is at its upper part exposed, by

reason of the divergence of the muscles towards their superior attachment. The vessel just named, with the two into which it divides, (external carotid and internal carotid,) with the commencement of some of the branches of the former (superior thyroid, lingual, facial, and occipital), are seen to lie in a triangular space, the sides of which are formed by the sterno-mastoid, the omo-hyoid, and digastric muscles. This triangle and those elsewhere noticed, are apparent only in the dissected neck, and they are referred to in this work not because of any real or practical importance attached to such modes of description, but in deference to the practice of writers of anatomical works. At the lower part of the neck is another triangular space, bounded by the clavicle, the omo-hyoid muscle, and the sterno-mastoid or anterior scalenus. In this, the subclavian artery is seen to lie with the anterior scalenus muscle to its inner side, and the brachial plexus of nerves to its outer side.

The arteries which cross the neck between the trapezius and sterno-mastoid muscles have important relation to operations performed on the subclavian artery, and will be again referred to in treating of that artery and its branches.

EXPLANATION OF PLATE IV.

Nearly the same view of the carotid artery and its branches is given in this plate as in the preceding; but here it is seen in relation with the veins, the nerves, and the fascia of the neck.

a Masseter muscle, at the anterior margin of which the facial artery is seen after escaping from under the submaxillary gland, to wind upwards over the lower maxillary bone.
b Parotid gland, partly covered by cervical fascia.
d Digastric muscle.
e Submaxillary gland.
f Cervical fascia.
g Sheath of the vessels.
h Sterno-mastoid muscle.
i Thyroid cartilage.
j Omo-hyoid muscle.
k Sterno-hyoid muscle.
l Sterno-thyroid muscle.

1. Common carotid artery.
2. Internal carotid.
3. External carotid.
4. Internal jugular vein.
5. Vagus nerve.
6. 9th or hypoglossal nerve.
7. Junction of the descending branch of 9th or hypoglossal nerve (n. descendens noni.) with a branch from the cervical nerves. The form of the union between these nerves varies in different bodies. In that of which this plate is a representation, two cervical nerves united into a single branch, which is seen to turn round the internal jugular vein, and join with the branch descending over the carotid artery from the ninth.

Fig. 1.

On turning aside the integuments and the platysma-myoides, a portion of which (latter) remains upon the inferior maxilla and below that bone, the cervical fascia is seen to cover the sterno-hyoid, sterno-thyroid, and omo-hyoid muscles, and to encase the lower part of the sterno-mastoid. The same membrane binds into its place the parotid gland, on which a portion has been left.

The "sheath of the vessels" covers the artery, vein, vagus nerve, and in this case also the branch descending from the ninth nerve, together with that which joins it from the cervical nerves.

The smaller veins and arteries, which branch out over the upper part of the common carotid, are a source of difficulty in the operation for placing a ligature on that vessel in this situation. In some cases the number of veins is greater than here represented, so as occasionally to amount even to the condition of a plexus; and the difficulty from this cause is proportionably increased.

Figs. 2 and 3.

The second and third drawings show peculiarities of the veins; in the former, the internal jugular covers the common carotid artery to such an extent that the vein must, in such a case, have been turned aside, in order to expose the artery. In the latter, the large vein covers the common carotid at its bifurcation, and an additional vein of smaller size (anterior jugular) is seen to the inner side of the artery. The anterior jugular vein, which is frequently found, is sometimes close to the middle line, and is occasionally joined to the

external jugular by transverse communicating branches. After turning outwards at the lower part of the neck between the sterno-mastoid and the muscles beneath it, the anterior jugular ends in the subclavian vein, or in the external jugular. (See plate 2).

FIG. 4.

In this sketch the vagus nerve lies over the carotid artery. The caution suggested to the surgeon by this position of the nerve is obvious.

EXPLANATION OF PLATE V.

ARCH OF THE AORTA.

THE same parts are marked with the same letters or numerals in all the figures of this plate.

a The heart.
b Trachea.
c Bronchus.
d Œsophagus.

ARTERIES.

1. Arch of Aorta.
2. The descending part of Aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Right external carotid.
6¹. Left external carotid.
7. Right internal carotid.
7¹. Left internal carotid.
8. Pulmonary.

VEINS.

9. Innominate of right side.
9¹. Innominate of left side.
10. V. Azygos.
11. V. Cava superior.
12. Hepatic veins.

Some of the peculiarities of the arch of the aorta are illustrated in this plate.

POSITION OF THE ARCH.

The most frequent changes of the arch, independently of slight varieties of shape, take place in its position with reference to the upper part of the walls of the chest. Its top or highest part is usually somewhat less than an inch from the upper margin of the sternum.

Figure 1 is taken from a body in which the arch was exactly opposite the interval between the first and second dorsal vertebræ, and but a little below the level of the top of the sternum. In Figure 2 the arch is seen to be deeply placed in the chest; its upper margin being as low as the middle of the fourth vertebra. In the first case the innominate artery rose high into the neck. In the second, that artery divided within the chest, and the subclavian artery too, lay within that cavity, from which it ascended perpendicularly and close to the carotid. The cases delineated may be considered as opposite extremes, between which there are many intermediate degrees. (See table.) The influence of the position of the arch of the aorta here referred to on the accessibility of the innominate artery in a surgical operation, and on the size which aneurism of the aorta directed upwards would attain before making its appearance at the bottom of the neck, is so obvious as not to require comment.

In the notes taken of the condition of the arch of the aorta it is stated in many cases that its position is higher and in others that it is lower than usual. The exact distance was ascertained in but a few cases, which are here subjoined—

No.	Distance in inches between the highest part of the arch and the top of the sternum.	No.	Distance in inches between the highest part of the arch and the top of the sternum.
53	$1\frac{1}{2}$	96	$\frac{1}{2}$
58	$\frac{3}{4}$	98	$\frac{1}{2}$
59	$1\frac{1}{4}$	117	$1\frac{1}{2}$
67	1	121	$\frac{3}{4}$
73	$1\frac{1}{4}$	142	nearly 3.
74	$\frac{3}{4}$	249	} nearly on a level with sternum.
80	$1\frac{1}{2}$		
89	} nearly on a level with top of sternum.	250	} arch opposite middle of 4th dorsal vertebra.
90	$\frac{1}{2}$	262	$1\frac{1}{2}$
91	1	272	$1\frac{1}{2}$
92	$\frac{3}{4}$	289	$\frac{3}{4}$
94	$\frac{3}{4}$		

ABSTRACT OF THE TABLE.

Cases in which the highest part of the arch was distant less than 1 inch from the upper margin of the sternum	11
1 inch, not exceeding $1\frac{1}{2}$	9
more than $1\frac{1}{2}$	2

RELATION OF THE ARCH TO THE POSTERIOR SURFACE OF THE STERNUM.

The ascending part or right side of the arch, it is well known, is separated by only a small interval from the sternum. The following fact may be mentioned as illustrative of this point:—In some bodies in which the arteries had been injected from the abdominal aorta, the ascending part of the arch was found to be slightly flattened in nearly its whole length, doubtless in consequence of pressure against the sternum, while the injection became solid. The artery did not appear to be unusually distended, though it must have been so in some degree, and there was not any perceptible change of the shape of the arch.

UNUSUAL DIRECTION OF THE ARCH.

Figure 3 is drawn from a preparation in the Museum of University College, taken from the body of a person who was condemned to death for arson. It shows the arch of the aorta and the large veins in the state which accompanies transposition of the viscera. The aorta curves to the right side, turning over the root of the right instead of that of the left lung, at the same time that the vena azygos has suffered a similar change from the right, its usual course, to the left side*.

In Figure 4, taken from a preparation in the Museum of St. Bartholomew's Hospital†; the aorta corresponds in its disposition to the preceding case, but the vena azygos, instead of being of the usual size, is here continued from the inferior cava. A full description of this case has been published by Mr. McWhinnie‡, who says of the veins—"A remarkable

* Cases of this kind are not very uncommon. This, however, is the only one observed in University College amongst 930 bodies. For a drawing of another case, which occurred in the Westminster Hospital, I am indebted to my friend Mr. Thurnam.

† The permission to have this and some other drawings made from preparations in the same museum, I owe to the kindness of Mr. Paget.

‡ A case of transposition of the thoracic and abdominal viscera, accompanied with an unusual variety in the venous system. London Medical Gazette, 27th March 1840.

feature in the case is the disposition of the vena cava inferior, which after being formed by the union of the common iliac veins (in this instance as high as the first lumbar vertebræ), and receiving the lumbar, renal, spermatic, and phrenic veins, entered the chest through the diaphragm, close to the left of the aortic opening. From this point it continued to ascend parallel with and to the left of the aorta, and arriving on a level with the arch of this vessel, curved forward over the left pulmonary vessels to join the vena cava superior."

"The venæ cavæ hepaticæ united to form a trunk, which entering the chest through the left of the tendinous centre of the diaphragm, terminated separately in the reversed right auricle."

Fig. 5.

Cases are recorded by Abernethy*, Fiorati†, Sandifort‡, Cailliot§, J. F. Meckel||, Bernhard¶, Otto**, and others, in which the aorta arched over the right bronchus with the vena azygos, (see fig. 5, and plate 7, fig. 1 & 3,) and afterwards resumed its usual situation on the vertebræ. This condition contrasts with that illustrated in the two preceding figures, in this respect, that the aorta and vena azygos are here side by side, whereas in the cases alluded to in the preceding sections these vessels are transposed or change places one with the other.

The aorta, in some of the cases above referred to, after turning over the bronchus speedily inclined to its usual situation on the bodies of the vertebræ††, in others the inclina-

* Account of two instances of uncommon formation in the viscera of the human body. Philosophical Transactions, 1793, p. 59.

† Osservazione Anatomica del Signor Girolamo Fiorati. Insolita posizione dell' Aorta e Stravagante origine de' suoi primi rami—in Saggi scientifici e letterari dell' Acad. di Padova, 1786.

‡ Museum Anatom. tom. 1, partes molles morbosæ, p. 79.

§ Extrait de trois Observations, &c.—in Bulletin de la Faculté de Médecine de Paris, tom. i. 1812.

|| Handbuch der Pathologischen Anatomie, zweiter Band, erste Abtheilung, s. 97, Leipzig 1816.

¶ De Arteriarum e Corde prodeuntium aberrationibus. Berolini, 1818.

** Seltene Beobachtungen. Th. 2, s. 61.

†† After describing the curve of the arch over the right bronchus, Mr. Abernethy continues, "The aorta afterwards pursued its ordinary course." In the account of one of Cailliot's cases it is said, "L'aorte embrassait dans sa courbure la bronche droite et passait derrière l'extrémité inférieure de *la trachée artère*, pour aller gagner le côté gauche de la colonne vertébrale."

tion to the left side occurred considerably lower down*, but in every instance the vessel appears to have gained its ordinary position before reaching the abdomen.

It is mentioned by Otto, a learned anatomist and acute observer, in his statement of the examination of the body before referred to, that on directing attention to the vertebral column at the upper part of its dorsal division, he found the convexity of the slight lateral curve which exists in that situation directed to the right side, i. e. towards the point at which the arch of the aorta was applied to the vertebræ. This fact militates against the opinion that the inclination of the spine is referable to the action of the heart and the contact of the large artery, and affords an argument scarcely perhaps needed, in favour of the influence of muscular action, as the cause of the deviation in question, a view which gains further support from the additional observation that the right arm was more muscular than the left.

In Mr. Abernethy's case, which was that of a fœtus at the usual period of birth, the condition of the vena azygos requires notice. In the figure (No. 5) which has been sketched from the preparation preserved in St. Bartholomew's Hospital, the vena azygos is seen to be of unusual size: it continued from the vena cava inferior as in the case delineated in fig. 4, from which, however, it differs in its relation to the aorta and to the bronchus. In his account of the case, Mr. Abernethy says, "The situation of the heart was reversed, the basis of that organ was placed a little to the left of the sternum, whilst its apex extended considerably to the right, and pointed against the space between the sixth and seventh

* Bernhard follows up his account of the course of the arch over the right branch of the trachea thus :—"Tum pone dextrum ramum arteriæ asperæ in latere dextro vertebrarum corporum descendit, quo in situ vena quoque azyga, ut solet, huic ad dextrum posita erat et œsophagus ad sinistrum latus, ita tamen, ut illa simul ante eam positus esset. Denique *in regione septimæ vel octavæ dorsi vertebræ* sinistrorsum inclinata in decursu solito per hiatum aorticum in cavum abdominis descendit, in quo a normali positura haud amplius recessit." Lib. cit. § 7.

Aorta jam inde a basi cordis egressa, solitumque emensa spatium, versus dextras in arcum sese flectens progrediebatur, ita ut truncus ejus descendens latus fere dextrum vertebrarum legeret, *usque dum, e diaphragmate in abdomen emergens,* sinisterius, quemadmodum assolet, se converteret. Aglietti in Sandifort loco citato.

Of the same case Fiorati says, "Così seguia suo cammino, che non mi parve importante di far desegnare, *fino all'ultima vertebra del dorso* nel qual sito inclinandosi a sinistra prendeva il suo posto ordinario," &c.

In Otto's case the artery did not incline to the left side till it approached the Diaphragm.

ribs. The cavities usually called the right auricle and ventricle were consequently inclined to the left side of the body. The inferior vena cava passed as usual through a tendinous ring in the right side of the centre of the diaphragm, it afterwards pursued the course of the vena azygos, the place of which it supplied, &c.——The veins returning the blood from the liver united into one trunk which passed through a tendinous aperture in the left of the centre of the diaphragm, and terminated immediately in the anterior auricle."

UNUSUAL CONFORMATION OF THE COMMENCEMENT OF THE AORTA.

Figs. 6 and 7.

The arrangement of the great artery represented in these drawings has been very rarely met with in man, though it corresponds to that which is usual in many mammalia. The case here delineated was observed by Klinz * in the body of a young soldier, Paul Markow, who appears to have been healthy up to the period of being attacked with an acute inflammatory disease of the chest, which caused his death.

In Figure 6, the aorta, without forming an arch, divides into an ascending and a descending branch. The former was directed vertically upwards to the length of four inches, and then divided in form of a cross into three principal branches. The right horizontal branch is the innominate, and from it arose the right carotid artery. The perpendicular branch became the left carotid, and the left horizontal one is the left subclavian.

J. F. Meckel, in noticing the case, remarks on the vertical direction of the heart, seeming to consider this circumstance as an additional approximation to the state of the organs in lower animals †. This fact may, however, be reasonably attributed to the accumulation of fluid found in the left cavity of the chest, which is stated in the report to have been so great as to have forced the mediastinum towards the right side. In the same manner may the condition of the left pulmonary

* In Abhandlungen der Josephinischen Med.-Chirurg. Acad. zu Wien. Band 1, S. 271, 1787.

† Merkwürdig ist dabei, dass auch das Herz, wie bei den meisten Thieren, senkrecht stand. Handbuch der Pathol. Anat. Band 2, S. 94.

artery be accounted for. That branch is not delineated in the plate (Fig. 7), and it is said to have been absent, as well as all trace of the lung and the bronchus. But it is highly probable that these parts were merely so compressed and altered by the disease (pleurisy) as not to have been recognised.

An example of similar conformation of the aorta was found by M. Troussieres in the body of a child aged five years. The account given of the appearances sets forth that the vessels were in their usual situation, except that the aorta did not form an arch, but divided into two large branches at three fingers' breadth from the origin *.

In dismissing this curious disposition of the aorta, it may be observed that the contemplation of it is calculated to recall to mind the origin of the terms "ascending" and "descending" aorta. These words were introduced into anatomical language at a time when the systemic artery was supposed to divide, as shown in Fig. 6, into two parts, which took opposite directions, and were properly named ascending and descending. The idea of the form of the aorta was then taken, as is generally known, from its state in quadrupeds; but the terms were retained even when the error as to the fact had been removed. As an evidence of the late origin of correct anatomical knowledge, it is worthy of remark to how advanced a period of the history of mankind the error alluded to continued. Even the great leader in the regeneration of anatomy, who observed so much and so well, and removed so many errors, delineated and described the aorta as dividing into two parts †. The modern understanding of the words applied to the right and left sides of the aortic arch is well stated by Ruysch ‡; but the real condition of the artery in the human body had been known before that distinguished anatomist wrote.

* The examination of the body was made—"par M. Troussieres maistre chirurgien, en présence de Messicurs Garnier et Spon, Docteurs en Médecine." Extrait d'une lettre écrite de Lyon, 4 Nov. 1667, in Le Journal des Sçavans, 1668. Nouv. Edit. à Paris, 1729.

† Postquam verò magna arteria coronales deprompsit, à cordis basis centro sursum quodammodo sub venæ arterialis caudice conscendit: ac cordis involucrum perforaus, bipartitò scinditur, &c. Audreæ Vesalii Opera om. Anat. et Chirurg. cap. xii.

‡ Ita ut Aorta propriè in duos truncos à natura haud sit divisa, unus idemque truncus ascendens et descendens: siquis tamen hanc aortam, quatenus ascendit, ascendentem, et quatenus descendit, descendentem nominare velit, non renuam. Responsio ad eruditum Dnum Johannem Gaubium 1695.

FIG. 8.

Hommel, who had been the assistant of Haller *, described the very remarkable preparation represented in this figure, and gave a delineation, from which this is copied, with the omission of the heart and right lung, which are shown in the original drawing. "The aorta," says the author, "divided at the beginning of the arch (at the beginning of that which is called the transverse part of the arch?), and was again united at its end. Through the sort of island constructed by the bifurcation pass the trachea and œsophagus; a disposition, he correctly adds, perhaps never previously observed †.

FIGS. 9 AND 10.

These are taken from drawings given by Malacarne ‡, of a variety found in the body of an old man, and of which he has published a detailed account. The aorta arose by a single trunk, which was of large size, and contained five valves. At the distance of three lines and a third from the base of the heart, and after having given off the coronary arteries, it divided into two unequal parts, by the reunion of which the descending aorta was formed. From the two lateral vessels arose the cervical arteries, which presented the remarkable peculiarity that, instead of an innominate, and a common carotid artery, the external and internal carotids of both sides were given separately from the aorta. On each side three branches are seen, of which the first is the subclavian, the second the external, and the third the internal carotid artery. The course of the two carotid arteries in this case will be reverted to when the vessels of that name are specially under consideration.

Deviations from the usual conformation of important parts of the circulating system, so remarkable as those represented in the several figures which have here been passed in review, are calculated to suggest to every inquiring mind the question —in what manner is their occurrence to be accounted for? or how are they produced?

* Optimus Hummel meus olim Bernæ incisor. Haller Elem. Physiol. t. 2, p. 162.
† Commercium literarium. Hebdom 21. Norimbergæ 1737.
‡ Delle osservazioni in chirurgia &c., parte 2, 119.

The investigations of anatomists have shown that the vessels, after their first appearance in the embryo, undergo a series of changes which lead to that which is considered their ordinary or natural condition, and that the variations from that condition are for the most part referable to an arrest or deviation in the process of change. To demonstrate this by a series of instances, or rather to trace the changes which take place in the various phases of development, and to connect these with such aberrations as those referred to in the foregoing pages, would be an object of the highest interest. It is, however, one which would require much research, and would perhaps properly form matter for separate investigation. It is, moreover, altogether beyond the limits of practical utility, within which it is proposed to circumscribe this work. A few remarks may, however, be made on the subject as regards some of the peculiarities of the aorta and great vein, seen in the figures of plate 5.

As regards the aorta—at an early period of existence branches are given to each side from the parent vessel, which after embracing the trachea and œsophagus, meet at the vertebræ and constitute a single vessel, being analogous at this period to the permanent condition in fishes and reptiles. In the usual course of development one of these vascular arches on the left side forms the aorta, the others, with the exception of that connected to the pulmonary artery, being wholly or partially obliterated. To the persistence of a branch on both sides may the arrangement of the great artery in figures 8 and 9 be referred.

The state represented in figure 5, in which the aorta turns to the right side, may be conceived to result from the continuance of a branch on that, the right side, the usual one on the left being removed. It may be observed that the direction of the aorta over the right bronchus is that usual in birds.

Lastly, in the great size of the vena azygos, as seen in figures 4 and 5, may be recognised the continuance of that which, in the first periods of development, is the chief vein of the trunk.

EXPLANATION IN REFERENCE TO THE TABULAR VIEWS OF THE ARTERIES.

The number in the first column marks the same body in all the tables; so that the condition of all the arteries of any body, at least of all those noted, may be ascertained by reference to its number in the different tables.

The name, age, and sex, are not included except in the first table—that of the arch of the aorta—but by means of the number and a reference to that table these particulars may be ascertained for any other artery.

In every instance in which the condition of the vessel has happened not to be noted, the number of the body is omitted, except in the case of the arch of the aorta, in which the number is retained because of its connexion with the name, age, and sex, in that table.

EXPLANATION CONCERNING THE TABLE OF THE BRANCHES OF THE ARCH OF THE AORTA.

By the statement that the branches presented the usual arrangement, is implied that they were three in number: viz. Innominate, Left Carotid, and Left Subclavian; that these arose from the middle or highest part of the arch or nearly so; that the Left Carotid was somewhat closer to the Innominate than to the Left Subclavian.

Slight deviations from the disposition here described have not been considered sufficient to justify any special notice.

The foregoing condition of the branches, for shortness' sake, is generally indicated by the word "*usual.*"

The following are some of the abbreviations made use of:—

Br. Branch; R. Right; L. Left; fr. from; trans. transverse.

The names of the vessels are for the most part shortened by the omission of some of the last letters, thus: Car. stands for Carotid; Vert. for Vertebral; and so in other cases.

ARCH OF THE AORTA.

BRANCHES.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
1	M G	f.	41	2 Brs. (L. Car. fr. lower end of Innom.)
2	J C	m.	63	2 Brs., same arrangement as No. 1.
3	P P	m.	61	Usual arrangement of Brs.
4	E R	f.	84	Usual.
5	J L	m.	72	Usual.
6	M N	f.	52	Usual.
7	S T	f.	60	Usual.
8	M A	f.	40	Usual.
9	S S	m.	45	2 Brs. (L. Car. fr. lower end of Innom.)
10	E C	f.	73	2 Brs. close together and given fr.: R. end of trans. part of Arch (L. Car. fr. Innom.)
11	A C	f.	64	Brs. arise fr. R. curve of arch, and lower than usual.
12	C B	f.	80	Usual.
13	M R	f.	50	Usual.
14	J H	m.	60	Usual.
15	J G	m.	50	Brs. spring fr. R. curve of arch, and lower than usual.
16	P O	m.	40	Usual.
17	A M	m.	59	
18	S H	f.	81	Usual.
19	J K	m.	72	Usual.
20	W H	m.	47	Usual.
21	A B	f.	85	4 Brs. (L. Vert. fr. arch.)
22	M W	f.	54	
23	E O	f.	92	
24	M M	f.	23	Usual.
25	M P	f.	75	Usual.
26	M H	f.	75	Usual.
27	M B	f.	40	Usual.
28	C H	f.	adult	
29	C B	f.	83	Usual.
30	H W	f.	60	Brs. take origin fr. R. end of trans. part of arch, and lower than usual.
31	A W	m.	18	
32	M M	f.	78	Usual.
33	E H	f.	30	Usual.
34	M F	f.	50	L. Car. at origin very close to Innom.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
35	M S	f.	68	
36	W L	m.	69	Usual arrangement of Brs.
37	M K	f.	66	Usual.
38	W L	m.	53	Usual.
39	R K	m.	45	Usual.
40	C H	m.	26	Usual.
41	C C	f.	50	3 Brs. unusually arranged (1st. Com. trunk of Carotids. 2nd. L. Subclav. 3rd. R. Subclav.)
42	E C	f.	58	3 Brs. unusually arranged (1st. Com. trunk of Carotids. 2nd. L. Subclav. 3rd. R. subclav.)
43	J M	m.	81	Usual.
44	M F	f.	25	2 Brs. (L. Car. fr. Innom.)
45	J J	m.	20	2 Brs. (L. Car. fr. Innom.)
46	S E	m.	56	Usual.
47	W D	m.	43	Usual.
48	A J	f.	18	Usual.
49	J T	m.	20	
50		m.	adult	Brs. given from R. end of the trans. part of arch and close as possible. L. Subclav. very oblique.
51	S B	f.	65	Usual.
52	E S	f.		L. Car. at origin is very close to Innom.
53	T D	m.		Usual.
54	W R	m.	66	Usual.
55	G S	m.	30	Usual.
56	M R	f.	76	
57	M C	f.	85	4 Brs. (L. Vert. fr. arch.)
58	M K	f.	31	Usual.
59	W L	m.	77	Usual arrangement of Brs.
60	D F	m.	40	Usual.
61	N A	m.	50	Usual.
62	J S	m.	51	
63	W W	m.	60	Brs. spring from R. end of trans. part of arch and close together.
64		m.	about 50	Usual.
65	S B	f.	35	2 Brs. (L. Car. from beginning of Innom.)
66	M N	f.	57	Brs. arise fr. R. end of trans. part of Arch.
67	M A	f.	18	2 Brs. (L. Car. fr. Innom.)
68	J K	m.	62	
69	J M	m.	22	4 Brs. (L. Vert. fr. arch and runs superf. to the Infer. Thyroid.)
70	T C	m.	70	
71	W C	m.	52	
72	A H	f.	66	Brs. arise fr. R. end of trans. part of arch and close one to the other. Left Innom. vein crosses them higher than usual.
73	W W	m.	70	Usual.
74	C B	f.	60	L. Car. very close to Innom. at origin.
75	A T	m.	60	Same as No. 74.
76	E M	f.	47	Usual.
77	A A	f.	52	Usual.
78	D C	m.	46	Usual.
79	J H	m.	65	
80	C N	m.	27	Brs. equidistant at origin.
81	E T	f.	76	Usual.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
82	J N	m.	72	L Car. touches Innom. at origin.
83	E P	m.	60	2 Brs. (L. Car. fr. Innom.) given fr. R. end of trans. part of arch.
84	M R	f.	36	2 Brs. (L. Car. fr. beginning of Innom.)
85	W F	m.	63	
86	M B	f.	48	2 Brs. (L. Car. fr. Innom.) given fr. beginning of trans. part of arch.
87	E C	f.	40	
88	E R	f.	68	Usual.
89	T	f.	40	L. Car. joined to Innom. at origin.
90	J R	m.	85	Brs. take origin to R. of usual situation and below the highest part of arch.
91	S B	m.	45	
92	E T	f.	81	Brs. very close, and their origin is to R. of usual position.
93	M M	f.	42	Brs. arise to R. of usual position, and lower on the arch than ordinary.
94	J K	m.	55	Usual.
95	M H	f.	28	
96	H V	f.	60	Usual.
97	E S	m.	27	Usual.
98	M B	f.	76	
99	A F	f.	85	Usual.
100	C B	m.	26	Usual.
101	M G	f.	79	Usual.
102	W J	m.	75	
103	A W	f.	45	L. Car. joined to Innom. at origin.
104	G L	m.	50	Usual.
105	E W	m.	19	2 Brs. (L. Car. fr. Innom.)
106	J D	f.	80	Usual.
107	C M	f.	75	
108	G P	m.	adult	
109	J L	m.	adult	
110	E F	f.	70	L. Car. very close to Innom. at origin.
111	E H	f.	58	Usual.
112	M S	f.	83	L. Car. very close to Innom. at origin.
113	J W	m.	48	Usual.
114	H M	m.	30	Usual.
115	J A	m.	18	Usual.
116	P R	m.	67	Usual.
117	J S	m.	30	Usual.
118	P L	m.	29	Usual.
119	E Y	f.	49	
120	S C	f.	45	Usual.
121	S S	f.	32	Usual.
122	W R	m.	66	Usual.
123	W M	m.	68	
124	C R	f.	76	Usual.
125	J W	m.	57	
126	J W	m.	48	
127	C H	f.	35	Usual.
128	H C	m.	44	
129	E H	f.	64	Brs. are given from R. end of the trans. part of arch, and the origins of Innom. and L. Car. are lower than usual and close together.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
130	J D	m.	61	Usual.
131	R C	m.	51	L. Car. very close to Innom. at origin.
132	J T	m.	82	
133	R H	m.	30	
134	E C	m.	66	Usual.
135	A C	f.	89	Usual.
136	W J	m.	40	Usual.
137	J N	f.	56	4 Brs. — the Carotids and Subclavians arise separately from arch— R. Subclav. given from descending part of aorta.
138	M B	m.	75	Usual.
139	A C	f.	63	Brs. arise close together fr. right end of trans. part, and lower than usual on arch.
140	M L	f.	68	
141	W B	m.	66	
142	S M	f.	81	Usual.
143	T G	m.	72	
144	M C	f.	80	Brs. arise fr. R. end of trans. part of arch. Innom. and L. Car. joined at origin.
145	W N	m.	59	Brs. very close and arise fr. R. end of the trans. part of arch.
146		m.	55	
147	M J	f.	19	Considerable and equal spaces between Brs. at their origin.
148	E C	f.	60	
149	M B	f.	adult	
150	S F	f.	54	Brs. spring fr. R. end of the trans. part of arch, and very close together.
151	J T	m.	69	Brs. given fr. R. end of trans. part. L. Car. and Innom. joined at origin.
152	S H	m.	38	Usual.
153	J A	m.	70	
154	M M	f.	adult	
155	D C	m.	70	L. Car. and Innom. joined at origin.
156	E T	f.	35	Usual.
157	C D	m.	38	
158	A F	f.	56	3 Brs. unusually arranged (1st. Com. trunk of Carotids. 2nd. L. Subclav. 3rd. R. Subclav.)
159	M L	f.	60	2 Brs. (L. Car. fr. Innom.)
160		m.	adult	L. Vert. and L. Subclav. rise in conjunction fr. arch.
161	H H	f.	73	
162	C S	f.	22	L. Car. very close to Innom. at origin.
163	M S	f.	70	Brs. derived fr. R. end of trans. part of arch.
164	M N	f.	adult	
165	S L	f.	93	Usual.
166	E W	f.	91	Usual.
167	J L	f.	50	Brs. fr. R. end of trans. part of arch.
168	A F	f.	30	
169	E C	f.	63	Usual.
170	A C	f.	34	
171	A R	f.	54	Brs. arise fr. R. end of trans. part of arch.
172	S D	f.	31	Brs. close and given fr. beginning of trans. part of arch.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
173	J S	m.	56	Brs. close, and given fr. beginning of trans. part of arch.
174	W W	m.	65	Brs. arise fr. beginning of trans. part of arch.
175	M W	m.	36	
176	A S	f.	38	Usual arrangement of Brs.
177	W C	m.	30	4 Brs. equidistant at origin (L. Vert. fr. arch.)
178	M W	f.	33	2 Brs. (L. Car. fr. Innom.)
179	H G	f.	33	Arch broad, trans. part long and straight. L. Car. very close to Innom. at origin.
180	M R	f.	52	Brs. given fr. R. end of trans. part of arch.
181	J B	m.	55	Brs. fr. R. end of trans. part. Much of arch to left of L. Subclav.
182	J J	m.	50	Usual arrangement of Brs.
183	C F	f.	52	Usual.
184	W H	m.	54	Usual.
185	J B	f.	18	L. Car. at origin very close to Innom.
186	E H	f.	18	L. Car. close to Innom.
187	E N	f.	73	Brs. arise fr. R. end of trans. part of arch.
188	M C	f.	55	
189	T S	m.	adult	
190	M D	f.	60	
191	R K	m.	68	2 Brs. given fr. R. end of trans. part of arch. (L. Car. fr. Innom.)
192	S W	f.	46	Usual.
193	E S	f.	37	Usual.
194	J C	m.	46	Usual.
195	D D	m.	41	2 Brs. (L. Car. fr. Innom.)
196	F W	m.	adult	Usual.
197	T P	m.	20	
198	R N	m.	41	L. Car. close to Innom. at origin.
199	J B	m.	61	Usual.
200	J D	m.	43	Usual.
201	M H	f.	40	Usual.
202	W O	m.	32	Usual.
203	S B	f.	69	2 Brs. given fr. R. end of trans. part of arch (L. Car. fr. Innom.)
204	J C	m.	60	Usual.
205	S E	f.	65	Usual.
206	M M	f.	60	Usual.
207	J H	m.	68	Usual.
208	S R	f.	68	Usual.
209	E M	f.	80	Brs. take origin fr. R. end of trans. part of arch—much of it to their left.
210	M F	f.	29	
211	E H	f.	45	Usual.
212	J E	m.	59	
213	J E	m.	adult	Innom. takes origin much lower than usual, and at nearly 1 inch dist. from L. Car. The latter and L. Subclav. rise close together fr. middle of trans. part of arch.
214	A H	f.	51	Usual.
215	T T	m.	18	Usual.
216	M B	f.	81	Usual.

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
217	T H	m.	60	L. Car. at origin close to Innom., widely separated fr. L. Subclav.
218	S S	f.	50	Usual.
219	J W	m.	29	Usual.
220	J C	m.	70	Brs. given fr. mid. of a long trans. part of arch.
221	J F	m.	2	2 Brs.—L. Car. fr. Innom.
222	S S	f.	18	Usual.
223	M U	m.	28	Usual.
224	W G	m.	25	
225	H K	f.	20	Brs. equidistant at origin.
226	E B	m.	70	
227	M T	f.	80	
228	E K	f.	59	Usual.
229	A D	f.	50	
230	J L	m.	57	Brs. equidistant at origin.
231	T B	m.	adult	Usual.
232	J B	m.	48	
233	E B	f.	60	Brs. equidistant at origin.
234	E R	f.	50	3 Brs. unusually arranged (1st. Com. trunk of Carotids. 2nd. L. Subclav. 3rd. R. Subclav.)
235	W J	m.	19	2 Brs. (L. Car. fr. Innom.)
236	A K	f.	45	Brs. close together at origin, and equally so.
237	E T	f.	70	Usual.
238	A M	f.	80	Brs. given from R. end of trans. part of arch.
239	R W	m.	14	
240	S P	f.	27	Usual.
241	J H	m.	69	
242	T B	m.	55	Usual.
243	J C	m.	58	Brs. arise fr. R. curve of arch, and lower than usual.
244	J L	m.	64	
245	W F	m.	60	
246	S W	f.	37	
247	S W	f.	adult	Usual.
248	E W	m.	35	Usual.
249	M M	f.	40	Usual.
250	J H	m.	60	2 Brs. (L. Car. fr. Innom.)
251	A L	f.	64	L. Car. slightly joined to Innom. at origin.
252	J B	f.	24	Usual.
253	W H	m.	71	Usual.
254	T L	m.	75	Usual.
255	M J	f.	71	Brs. arise fr. R. end of trans. part of arch.
256	M H	f.	6	Usual.
257	T M	m.	adult	Usual.
258	M K	f.	70	Brs. fr. R. curve of arch, and lower than usual.
259	H C	f.	64	Usual.
260	S B	f.	75	Usual.
261	R W	m.	38	Usual.
262	M S	f.	60	Usual.
263	P M	m.	65	
264	M R	m.	54	
265	J C	m.	52	2 Brs. (L. Car. fr. Innom.)
266	H C	f.	19	
267	M H	f.	33	Usual.
268	J C	m.	57	2 Brs. (L. Car. fr. Innom.)

No.	Name.	Sex.	Age.	Number and Arrangement of the Branches.
269	J M	m.	84	
270	U F	f.	42	2 Brs. Innom. & L. Car. joined at origin, and form one thick trunk.
271	E A	f.	22	2 Brs.—Innom. arises fr. mid. of trans. part, and gives L. Car.—L. Subclav. given fr. left curve of arch.
272	S A	m.	adult	Brs. arise fr. R. curve of arch. Origin of Innom. lower than usual.
273	M R	f.	45	
274	M P	f.	72	
275	J C	f.	25	Usual.
276	W O	m.	20	
277	E G	f.	52	
278	S C	f.	86	L. Car. at origin close to Innom., and at a greater dist. than usual fr. L. Subclav.
279	J W	f.	29	Usual.
280	J R	m.	65	
281	D D	m.	35	
282	C F	f.	72	
283	M M	f.	70	
284	R M	m.	68	
285	E W	m.	30	
286	S D	f.	adult	
287	E D	f.	45	
288	E F	f.	75	
289	A J	f.	23	Usual.
290	F H	f.	28	2 Brs. (L. Car. fr. Innom.)
291	M H	f	28	Usual.

ARCH OF THE AORTA—BRANCHES.

ABSTRACT OF THE FOREGOING TABLE.

Cases in which the branches arose to the right of the usual situation, see plate 6, fig. 1 and 2.	35
Left Carotid more than usually close to Innominate, plate 6, fig. 5	15
Left Carotid joined with Innominate, plate 6, fig. 6	7
Left Carotid given from Innominate or both vessels united so as to form one large trunk, plate 6, fig. 7	25
Left Vertebral given from the Arch of Aorta	5*
3 brs. unusually arranged. 1st. Common trunk of both common Carotid arteries. 2nd. Left Subclavian. 3rd. Right Subclavian	3
The Carotid and the Subclavian arteries spring separately from the arch	1
The usual arrangement of the branches	121

There did not occur any more remarkable deviation from the usual arrangement of the branches in 930 bodies except that represented in plate 7, fig. 2.

* Judging by the preparations in my collection and the general impression on my mind, I should be disposed to regard this as an under-statement of the frequency of the occurrence of this variety. And though there is no doubt of the accuracy of the table, I should not be surprised to find the Vertebral artery given from the Aorta in a larger proportion of another series of cases.

INNOMINATE OR BRACHIO-CEPHALIC ARTERY.

In the following table the word "usual" is sometimes applied to the length of the artery and to the place of division—in the former case, it implies that the vessel, which was not measured, appeared to be from one and a half to two inches in length; when applied to the place of division, it is to be understood that this was situated behind the inner end of the Clavicle, or nearly on a level with its upper margin.

The abbreviations are similar to those explained at the beginning of the preceding table.

No.	Length in Inches.	Place of Division.	Peculiarities.
1	1½		gives L. Carotid close to origin.
2	1½		gives L. Carotid as No. 1.
3	1½		
4	2¾	opposite upper margin of the sternal end of Clavicle.	
5	1½		
6	2		
7	2		
8	1½	above the upper margin of the sternal end of Clavicle.	
9	1½		gives L. Carotid.
10			gives L. Carotid.
11			gives a small branch which descends on Trachea.
12		opposite upper margin of Clavicle.	
15	greater than usual.	below Sterno-clavicular Articulation.	
16		opposite upper margin of Clavicle.	
18	2½	1 inch above Clavicle.	gives a Thyroid branch.
19	2½	not above Clavicle.	
20		not above Clavicle.	
22		opposite Clavicle.	
23		same.	
24	1½		
25	1½		
26	usual.	opposite Clavicle.	
27	usual.	same.	
28	usual.	same.	
29	usual.	same.	
30	longer than usual.	not above Clavicle.	
31		opposite Clavicle.	
33		behind Clavicle.	
35		same.	

No.	Length in Inches.	Place of Division.	Peculiarities.
36			gives a Thyroid branch.
38	usual.	usual.	
39	usual.	usual.	
40	usual.	usual.	
41			no Innominata. See the arch of the Aorta.
42			same as No. 41.
43	usual.	usual.	
44	usual.	usual.	gives L. Carotid.
45	usual.	usual.	gives L. Carotid.
46	usual.	usual.	
47	usual.	usual.	
48	usual.	usual.	
49		considerably above Clavicle.	
50	usual.	usual.	
51	$1\frac{3}{4}$	not above Clavicle.	
52	2	usual.	L. Car. very close at origin.
53	2	usual.	
54	$1\frac{3}{4}$	usual.	
55	$1\frac{1}{2}$	usual.	
57	$1\frac{3}{4}$	opposite upper margin of the sternal end of Clavicle.	
58	$1\frac{1}{2}$	usual.	
59	$1\frac{3}{4}$	usual	
60	$1\frac{1}{2}$	usual.	
61	2	usual.	
63	$1\frac{1}{2}$	usual.	
64	2	usual.	
65	2	usual.	gives L. Carotid.
66	2	opposite upper margin of the sternal end of Clavicle.	
67	$1\frac{3}{4}$		gives L. Car. close to origin, and a Thyroid branch at bifurcation.
69	$1\frac{1}{2}$	usual.	
72	$1\frac{3}{4}$	usual.	left Innom. vein crosses the artery higher than usual.
73	2		
74	$2\frac{1}{8}$	usual.	L. Carotid is close to it at origin.
75	2	usual.	
76	2	usual.	
77	2	usual.	
78	usual.	usual.	
80	2		
81	$1\frac{1}{2}$		
82	$1\frac{1}{2}$	usual.	L. Carotid touches it at origin.
83	$1\frac{3}{4}$		gives L. Car. close to origin.
84	$1\frac{1}{2}$		gives L. Car. at lower end, or both united at their origin.
86	2		gives L. Car., which takes its rise higher than usual.

No.	Length in Inches.	Place of Division.	Peculiarities.
88	¾		
89	1¼		joined at origin to L. Car.
90	2		
91	2		
92	1¾	usual.	
93	2½	usual.	rises low down on the arch of Aorta.
94	1½	usual.	
96	1¼	usual.	
97	2	usual.	
98	2⅛	usual.	
99	2⅛	usual.	
100	2		
101	1½	usual.	
103	1¾	usual.	joined at origin by L. Car.
104	2	usual.	
105	2¼		gives L. Carotid.
106	1⅜	usual.	
110	1¾	usual.	close to L. Car. at origin.
111	1	usual.	
112	2	usual.	
113	1½		
114	1½	usual.	
115	1½	usual.	
116	2		
117	1¼	usual.	
118	1½	usual.	
120	1½	usual.	

No.	Length in Inches.	Place of Division.	Peculiarities.
121	1½	opposite upper margin of the sternal end of Clavicle.	
122	1½	usual.	
124	1½	usual.	
127	1¾	usual.	
129	1½	usual.	L. Car. close to its origin.
130	1½	usual.	
131	1¼	usual.	
134	2	usual.	
135	usual.	usual.	
136	2	usual.	
137			R. Car. and R. Subelavian arise separately fr. Aorta. (See the Arch of Aorta.)
138	2½	opposite lower margin of the sternal end of Clavicle.	
139	2¼		joined to L. Car. at origin.
142	2	considerably below the top of sternum.	
144	1¾	usual.	joined at origin to L. Car.
145	1¾	within Thorax.	
147	ordiny.	usual.	
150	1½		
151	1¼		joined to L. Car. at origin
152	1½		
155	1¼	usual.	

No.	Length in Inches.	Place of Division.	Peculiarities.
156	1½	usual.	
158			instead of an Innom., the first branch of the trans. pt. of the Arch of Aorta is a short trunk com. to both Carotids.
159			gives L. Carotid.
160	usual.	usual.	
162	usual.	usual.	L. Car. very close at origin.
163	2¼	higher than usual.	the Innom. and Subclav. arch upwards considerably above first rib and Clavicle.
165	1¼	usual.	
166	2	usual.	
167	1½	usual.	
169	2		
171	usual.	usual.	
172	usual.	usual.	
173	2	usual.	
174	2	not above Clavicle.	rises lower than usual on the Arch of Aorta.
176	1½	usual.	
177	1½	not above Clavicle.	
178	1	in the chest some distance below the upper part of its osseous boundaries.	gives L. Car. From the L. Car. to its bifurcation the Innom. measures three-quarters of an inch.
179	⅞	low in chest.	L. Car. close to Innom. at origin.
180	1½	opposite upper margin of the inner end of Clavicle.	
181	1⅞	usual.	
182	1¾	not above Clavicle.	
183	1½		
184	1⅜	usual.	
185	1¼		L. Car. close at origin.
186	1⅛		
187	1¾		
191	2¼	not above Clav.	gives L. Car. near origin, and a Thyroid br. near bifurcation.
192	1⅜		
193	1½		
194	1⅜		
195	1⅜		gives L. Car. at lower end and a Thyroid, which supplies place of the R. infer. Thyroid, near bifurcation.
196	1¾	usual.	
198	ordiny.	usual.	
199	1½		
200	1¾		
201	2	usual.	
202	2		L. Car. close at origin.

No.	Length in Inches.	Place of Division.	Peculiarities.
203	1¾		gives L. Car. a little above origin.
204	2¼		
205	usual.	usual.	
206	1⅝	usual.	
207	1½	usual.	
208	1½		
209	1		
210	usual.	usual.	
211	1¼		
213	1¾		the origiu is considerably lower than usual—fr. the end of the ascending part of the arch—and at distance of half an inch from origin of L. Car., which is close to L. Subclav.
214	1⅜	usual.	
215	1¼		
216	2		
217	1½		L. Car. close at origin.
218	⅞	in chest, nearly opposite lower margin of Clavicle.	
219	1⅞	same as 218	
220	1¾		
221			gives L. Car. at origin.
222	1¾		
223	1½	usual.	
225	1½	usual.	
228	1½	usual.	
230	2⅜	above sternal end of Clav.	
231	1⅛		
233	2		gives at the distance of ¼ inch from its bifurcation a small branch, which runs upwards under the muscles, and does not reach the Thyroid body.
234			no Innom.—in place of it is a trunk common to both Carotids.
235	1⅛	usual.	gives L. Carotid.
236	1⅜	usual.	
237	1½	usual.	
238	1⅛	usual.	
240	1¼	usual.	
242	1⅝		
243	2		joined to L. Car. at origin.
247	2		gives a Thyroid br. near bifurcation.
248	1½	usual.	
249	1½	a little above the margin of Clav.	
250	1¾	low in thorax—oppos. mid. of 2nd. dors. verteb.	joined to L. Car. at origin.

No.	Length in Inches.	Place of Division.	Peculiarities.
251	1¾	usual.	joined to L. Car. at origin.
252	1½		
253	1¾		
254	usual.	usual.	
255	1¾		
256	⅞		gives a Thyroid branch at junction with the com. Car.
258	1½	usual.	
259	1⅜	usual.	
260	1¼	usual.	
261	1⅜		joined to L. Car. at origin.
262	1⅜		
265	2		gives L. Car., above which it measures to bifurcation 1¼ inch.
266			
267	1½	usual.	
268	1½		gives L. Car. —from this to bifurcation of Innom. 1 inch.
270	1⅛		Innom. and L. Car. united at origin.
271	1½		gives L. Car.
272	2¼	¼ inch above Clavicle.	rises low on the Arch of Aorta.
275	usual.	usual.	
278	2⅛		close to L. Car. at origin.
279	2		
288	1⅛	below Clavicle.	
289	1¾	usual.	
290	1½	usual.	gives L. Carotid.
291	1½	usual.	

INNOMINATE, OR BRACHIO-CEPHALIC ARTERY.

ABSTRACT OF THE TABLE.

LENGTH.

Number of Cases in which the Artery measured 1 inch and under		8
Above 1, not exceeding 1½	81	
Half of those marked usual	24	
		105
Above 1½, not exceeding 2	66	
Half of those marked usual	24	
		90
Above 2		16

PLACE OF DIVISION.

Number in which the bifurcation of the Artery took place considerably above the Clavicle	7
At some distance below that bone	9
Behind the Sterno Clavicular-joint, on a level with the upper margin of the Clavicle, or nearly so	121

Innominate gave L. Carotid, or both vessels united into one large trunk	25
A Thyroid branch	7
A small Artery which ramified downwards over the Trachea	2

ARCH OF THE AORTA.

BRANCHES.

EXPLANATION OF PLATE VI.

The parts bear the same marks wherever they occur in the same plate.

a Larynx. | *b* Trachea.
d Œsophagus.

ARTERIES.

1. The commencement of the arch of the aorta.
2. The descending aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Vertebral.

EXPLANATION OF PLATE VII.

a Heart.
b Trachea.
*b*¹ Larynx.
c Bronchus.
d Œsophagus.
e The thyroid body.

ARTERIES.

1. The arch of the aorta.
2. The descending aorta.
\+ A pouch projecting from the aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Left vertebral.
6¹. Right vertebral.
7. Thyroid.
8. Internal mammary of the right side.
9. Pulmonary.
10. Ligamentum arteriosum, or Ductus arteriosus.

VEINS.

11. V. cava superior. | 12. V. azygos.

NERVES.

13. N. vagus of the right side. | 13¹. N. vagus of the left side.

THE BRANCHES GIVEN FROM THE ARCH.

The deviations from the ordinary disposition of the arch of the aorta referred to in the preceding pages, and represented in the majority of the figures in the fifth plate, are of very rare occurrence, insomuch, that in the number of bodies (nearly a thousand) over which my observation has extended with a special view to the subject, no important changes were found in the arch, with the exception of those which occur in its position or height within the chest, and the single case of transposed aorta accompanying transposition of the viscera (ante *a*, pages 15 and 16, and plate 5, figures 1, 2, and 3).

But the variations in the large branches given upwards from the arch are not unfrequent, as will be apparent on reference to the table, page 15 et seq., or to the abstract of it at page 32. The repeated statement of Haller *, that

* After enumerating some of the previously recorded variations in the arch of the aorta and its branches, he remarks—

"Natura hanc principem arteriarum originem fabricata est, adeo tamen hæ rara sunt, ut in quadringentorum cadaverum incisione nihil ejusmodi viderim, neque ante me, celebris olim ex manus medicantis et dissecantis solertia, Gulielmus Cheselden." Elem. Physiol. t. ii. p. 162.

The statement of Cheselden runs thus:—"By some authors these vessels have been described in a different manner; but I believe these descriptions were, for want of human bodies, taken from brutes; for I have never yet seen any variety in these vessels in humane bodies, though I have in the veins nearer the heart." The Anatomy of the Human Body, 4th ed. 1730, chap. viii. p. 175.

On the same subject Haller elsewhere writes thus:—"Nullum in eo arcu unquam varietatis, genus reperi, nisi quod eam sæpe varietatem vidi quam," &c. &c.; referring to several papers containing accounts of the origin of the vertebral artery from the aorta. He continues thus:—"Satis nempe frequenter vertebralem arteriam ex arcus parte sinistra inter subclaviam et carotidem prodiisse vidi." And after alluding to the descriptions of several varieties contained in various works, he adds, "Rara vero hæ omnia esse si dixero, cum quadringenta nunc cadavera humana disseeuerim, fidem forte inveniam. Iconum Anatom. fasele. vi. p. I."

It is worthy of remark, that the learned Dr. Barelay committed the oversight of mistaking the word *quadringenta* for *quadraginta*. In referenee to the last-eited passage, he says, "Haller, remarking that all such eases are extremely rare, expresses a hope that after disseeting forty (ought to be four huudred) bodies, he may be allowed to obtain some eredit for his assertion." A Deseription of the Arteries of the Human Body, p. 9, note. Edinburgh, 1820.

notwithstanding his large experience, he had witnessed no other arrangement of the arch and its branches than the ordinary one, with the exception of the left vertebral artery arising from the aorta, is to be attributed partly to the circumstance of his not having directed attention to some changes recorded in this work; partly, also, to the vagueness and want of accuracy which are inseparable from a reliance on general impressions only, where facts are concerned.

Before entering on the consideration of the variations which take place in the branches of the arch of the aorta, it is necessary in the first place to state, that the coronary and bronchial arteries will not be referred to under this head; secondly, it is necessary to determine that standard condition from which others are said to vary, viz. the most frequent, and therefore the usual condition of the vessels. It is universally and correctly stated by anatomists, that the most frequent arrangement is that in which the innominate, the left carotid, and the left subclavian arteries are derived from the middle or the top of the arch; the left carotid being somewhat nearer to the common trunk of the arteries of the right side, than to the vessel destined to its own side.

CLASSIFICATION OF THE VARIATIONS IN THE BRANCHES.

So numerous are the forms of deviation from the standard condition, that some arrangement or classification is indispensably necessary. They admit at the outset of being separated into two classes:—

1. The first, to comprise the cases in which the primary branches, viz. the carotid and subclavian arteries, or the innominate, the common trunk of two of these, are concerned.

2. The second to include those in which one or more secondary branches, usually given from the subclavian, take origin directly from the aorta.

CLASS I.

The variations included in the first class, namely those in which the primary branches are concerned, affect—

a The situation which the vessels occupy on the arch.

b The contiguity of the branches one to another; (in both of these cases the vessels retain the order in which they usually take their origin).

c Their number, relative position, and arrangement.

a VARIATIONS IN THE SITUATION WHICH THE VESSELS OCCUPY ON THE ARCH.

PLATE 6—FIGURES 1 AND 2 *.

Instead of being given from the middle or highest part of the arch, the branches frequently are moved towards the right side, taking rise from the right end of the transverse part of the arch, or the curve on that side. When such a change occurs, their origin is, in consequence of the arched shape of the great parent vessel, almost necessarily lower than ordinary, and that of the innominate must obviously be lower than either of the other arteries. It is apparent that the length of the last-named vessel, which would be requisite to reach above the clavicle, and cause it to be accessible in the neck when it takes origin in the usual situation, would be insufficient to extend to the same point under the circumstances here alluded to.

When the arteries arise, as indicated, on the right of their usual situation, they are generally close one to the other, and appear as it were crowded together on the aorta (fig. 1). Occasionally, however, they are not so, as is exemplified in fig. 2, which shows the innominate removed from the other arteries, the left carotid being closer to the left subclavian than to it.

b VARIATIONS IN THE CONTIGUITY OF THE PRIMARY BRANCHES ONE TO THE OTHER.

The branches sometimes take their rise at equal distances one from the other (fig. 3); and the distance between them

* Taken from preparations 253 *a* & *b* in my collection.

is occasionally, but rarely, much greater than in this figure, or than is usual.

The change most frequently observed in the position of the branches, results from the tendency which it may be said the left carotid has to approach, and even to join the innominate. In figures 3, 4, 5, 6*, that vessel undergoes a gradual transition towards the innominate, until, in figure 7 *, it arises from that artery.

c. VARIATIONS IN THE NUMBER, THE RELATIVE POSITION, AND ARRANGEMENT OF THE PRIMARY BRANCHES.

The primary branches may be decreased from their usual number to two, or augmented to four. There is no example with which I am acquainted of a greater extent of departure from the usual number than those here stated, with the exception of two cases †, in which it was increased to six. An additional source of variation in the primary branches arises from a difference in their arrangement, the number being unchanged from that which is usual.

Reduction of the number of the primary branches.—Of this variety three examples are given in figures 7, 8, and 9.

In figure 7, the left carotid is derived from the innominate. The observations recorded above show this to be by much the most frequent change which occurs in the number of the branches. This statement is not in accordance with that usually made by anatomical writers, who are almost unanimous in regarding the increase of the number by the origin of the left vertebral artery from the arch as the most frequent source of change in the branches ‡.

Figure 8 is sketched from the work of Tiedemann, (plate 4,

* Drawn from preparations 127 and 129 *a b c* in my collection.

† Malacarne's case, plate 5, fig. 9, and another which will be referred to under the head of the Carotid Arteries.

‡ Haller, in a passage of the Icon. Anatom. previously cited.

J. F. Meckel observes—"Häufiger vermehrt sich die Zahl der Stämme, als dass sie sich verminderte. Am gewöhnlichsten übersteigt die Zahl der Stämme die regelmässige nur um eine, so dass sich vier finden. Dies geschieht nicht immer auf dieselbe Weise. Meinen Erfahrungen nach wird es am häufigsten dadurch bewirkt dass die linke Wirbelpulsader, der Regel nach ein Ast der Schlüsselpulsader, unmittelbar aus der Aorte entsteht." Handbuch der menschlichen Anatomie, Band 3—Halle und Berlin, 1817.

Professor Harrison says, "Exceptions to this (the usual) order frequently occur: the most common one is that of four arteries arising from the middle of the arch, the additional branch being generally the left vertebral," &c. The Surgical Anatomy of the Arteries, vol. i., p. 11.

fig. 8,) in which it is stated of the case merely that it was observed by Zagorsky. Now, on reference to the essay of the Russian anatomist, I find that he has not illustrated the description by a drawing: the representation given by Tiedemann is, in consequence, to be regarded as a plan made in conformity with the description in the original paper.

It must further be remarked, that the account of the preparation published by Zagorsky is defective, inasmuch as it contains no allusion to the state of the aorta *. This omission diminishes considerably the value of the case; for with such an arrangement of the branches, our experience would lead us to expect that the arch should be directed to the right side, seeing that the tendency of the branches is to approach and to join one to another towards the beginning of the aorta, —for such the right side may be considered when the great vessel has its usual course. In the absence, therefore, of information as to the aortic arch, the case in question will be regarded as of doubtful value.

Figure 9 is also taken from Tiedemann. He observed an example of this arrangement of the vessels in the Museum of Berlin. Similar cases had been previously described but not figured by Malacarne † and Biumi ‡.

Increase of the number of the primary branches.—This variety may be said to arise from the decomposition or division of the innominate trunk; the right carotid and subclavian taking their rise directly from the arch of the aorta.

The figures 10, 11, 12 and 13, show the two carotid and the left subclavian arteries arising from the arch in the usual order. But the right subclavian artery undergoes a gradual transition from the right to the left side; thus in figure 10 the right subclavian and carotid have the relation, which may

* After describing the arrangement most usual when two branches arise from the aorta, the author continues in these words—"In nostro autem subjecto vice versa res se habebat; truncus enim dexter pergebat, pectore egressus, ad solam extremitatem dextram, sinister vero spargebat utramque arteriam carotidem et subclaviam sinistram." Mém. de l'Acad. Impériale de St. Petersbourg, tom. i., St. Petersbourg, 1809.

† "Ho però negli anni seguenti veduto in due cadaveri umani dall' arco dell' aorta a nascere le due sole succlavie, e da caduna di questa una carotide." Osservazioni in Chirurgia, parte ii., p. 128, Torino 1784.

‡ "Subclavia sinistra orta est singulari plane exemplo ex carotide sinistra. Itaque duæ tantum arteriæ ex arcu prodibant. Nil tale unquam vidi." Francisci Biumi, Philosophi et Medici, Observat. Anatom.; tomus primus, observat. 10.

be supposed to result from a simple division of the innominate; in the eleventh figure the subclavian is seen to have passed to the left of one carotid; figure 12 shows it beyond the other carotid, and in figure 13 it has proceeded beyond, or to the left side of the left subclavian artery.

It is remarkable that when the four primary branches are given separately from the arch of the aorta, the arrangement which apparently deviates most from the usual disposition, that, namely, in which the right subclavian arises from the left side of the aorta, is of much the most frequent occurrence. That vessel, when it does not spring from the innominate, is usually given at the point indicated.

Some instances are published of the arrangement represented in figure 10 *, but of the variations shown in figures 11 † and 12 ‡ I have not seen an account of any other examples than those from which were taken the original representations here copied.

In plate 7, figures 1 § and 1', is represented an arrangement of the vessels the reverse of that in the last figure of the preceding plate. The left carotid is the first branch, the carotid of the right side the second, the right subclavian follows emanating from the highest part of the arch; lastly,

* "When there are four, the two middle branches are termed Arteriæ Carotides; the other two Subclaviæ; and both are distinguished into right and left." An anatomical exposition of the structure of the human body by James Benignus Winslow, transl. by G. Douglas, M.D. Vol. 2, p. 3. London, 1776.

"Weniger vom Normal abweichend ist die Spaltung der aus dem Aortenbogen entspringenden Stämme, wo alle an ihrer normalen Stelle bleiben, die rechte Schlüsselpulsader also zuerst entsteht. Diese beobachteten * * * und ich in zwei Fällen."—J. F. Meckel—Handbuch der Pathol. Anatom. baud 2, s. 107.

† The figure has been slightly modified from that published by Hüber. Of the case he observes "Nullum exhibebat cadaverculum puellæ in partu extinctæ iunominatam arteriam. * * Seorsim enim e centrali quasi arcus parte prodibat arteria Subclavia dextra, latens primo intuitu, et pone Carotidem sui lateris incedens, suam versus clavicnlam mox obliquato incessu tendebat, in consuetos ibidem ramos divisa. Sola nempe exibat ex arcu Carotis dextra, recta adscendens, ortu suo prima, s. dextima."—Acta Helvetica, &c. vol. viii. observat. iv. p. 74. Basileæ 1777.

‡ This representation is copied from one of several published with the descriptions of the cases by Walter in the Nouveaux Mémoires de l'Acad. des Sciences & Belles Lettres, Berlin, 1785.

§ Of the case represented in these figures Fiorati and Sandifort published representations at different times, the preparation having been taken from Italy to Leyden and presented to Sandifort by Aglietti, who had been a pupil of the Italian professor. The former figure is taken from Fiorati without other alteration than the omission of the larynx, and a little addition made to the distinctness of some of the parts. The latter sketch is copied from one of those contained in the valuable work of Sandifort. See autc *a*, page 18.

the left subclavian is connected to the descending aorta, or the end of the arch. This alteration of the origin in the branches accompanies the reversed course of the arch of the aorta, which was directed over the right bronchus. The case also presents an example of a remarkable peculiarity in the mode of origin of one of the branches, namely the left subclavian artery, which is here the last branch. That vessel does not take its rise immediately from the aorta, but from a projection from it or pouch (†), which at nearly the same point receives the attachment of the ligamentum arteriosum (10) and gives origin to the subclavian artery (5^1). In figure 1. b. the pouch is more clearly marked than in the larger drawing. Though it is not distinctly stated in the account published of the preparation by Fiorati, or in that by Sandifort, there is little doubt that the trachea and œsophagus were anterior to the pouch, between it and the aortic arch.

The recurrent laryngeal nerves are singularly disposed in this case. The nerve of the right side is seen to turn round the aorta in the same manner that it does on the opposite side when the great vessel arches in the usual direction; on the left side the nerve winds round the ligamentum arteriosum.

The preparation (No. 72 in my collection) represented in figure 2 was found in the body of a male idiot of about 20 years of age. The arrangement of the branches at their origin may be said to be very irregular. Thus the left carotid arising as the first branch crosses by the two arteries of the right side, and the right subclavian, from the position at which it arises from the aorta, is directed behind the carotid to its usual position under the clavicle. In this case, as in that represented in the preceding figures, the left subclavian takes its origin at a considerable distance beyond the other arteries from a pouch: this is more clearly seen in the profile view of it, figure 2. b., which is taken from the same preparation. The carotid arteries in figure 2 are of very unequal size, that of the right side is much smaller than usual. From the examination, not a very careful one, which was made of the artery in the neck—the skull was not permitted to be opened—it was concluded that there was no internal carotid artery; but it was not ascertained how the deficiency was

supplied. It will, however, be noticed that the internal carotid of the opposite side is unusually large, and the size of this artery suggests the probability that it compensated for the absence of the vessel of the right side.

The number of the branches the same as usual, but their arrangement is altered.—The third source of variation in the primary branches arises from a difference in their arrangement, the number continuing three, the usual one. Different forms of the condition are represented in figures 3, 4, 5, and 6.

The three branches given from the aorta in figure 3* are obviously the reverse of the usual arrangement, consequent on the altered direction of the arch of the aorta, which is curved to the right side. Other examples of the same arrangement of the branches and the arch of the aorta are contained in the fifth plate, figures 3, 4, and 5.—In the case before us, the ductus arteriosus, which was pervious, is seen to end in a very unusual manner, inasmuch as it joins the left subclavian artery a little beyond the innominate, without forming any connexion with the aorta. The recurrent laryngeal nerve at the left side is directed behind the ductus arteriosus, and it is probable that the nerve of the opposite side turned round the arch of the aorta; but the written description contains no allusion to the nerves.

The interesting facts in reference to the origin of the left subclavian artery and its connexion with the pulmonary artery, illustrated in this and the preceding figures of the same plate, will come under consideration when the anatomy of the subclavian arteries is being discussed.

The conditions of the large branches represented in figures 4† and 5‡, have some analogy one to the other. In both the

* Copied from Bernhard's drawing (loco citat.), the lungs and the trunk of the body, which are represented in the original, being omitted.

It is necessary to observe that the description given of this case by Tiedemann is correct so far as it goes, but the drawing (Tab. iv. Fig. 9) differs from the description, and does not correspond with Bernhard's original figure.

† Of the figure given in his third plate, from which this has been taken, Tiedemann observes, "Proponit rarissimam varietatem, quæ mihi in dissecando cadavere juvenis viginti duorum annorum occurrebat."

Portal met with a case of the same kind, which he thus refers to, "J'ai vu les deux carotides réunies en un seul tronc dans un sujet chez lequel les deux sous-clavières aboutissoient immédiatement et séparément dans la cavité de l'aorte."—Cours d'Anatomie Médicale, t. iii. p. 155.

‡ From a preparation (No. 401) in my collection.

carotid arteries are joined, and the right subclavian arises separately; but in the one that vessel issues from the commencement of the transverse part of the arch before the other branches; in the other, it is given from the end of the same part, and beyond the left subclavian.

Figure 6*, which also represents an example of three primary branches, the unusual circumstance of the junction of the left carotid and the subclavian of the same side is to be noticed. A junction of the same kind is exemplified in plate 6, figure 9. Considering, however, that when the aorta arches over the root of the right lung, the carotid and subclavian arteries are usually joined on the left side (see pl. 5, figs. 3, 4, 5, and pl. 7, fig. 3), it would be more correct to say, in reference to the disposition of the vessels represented in the figure under observation, that it exemplified the unusual circumstance of a junction between the carotid and subclavian arteries, which arise most remotely from the origin of the aorta.

CLASS II.

CASES IN WHICH ONE OR MORE SECONDARY BRANCHES USUALLY GIVEN FROM THE SUBCLAVIAN ARTERY TAKE ORIGIN DIRECTLY FROM THE AORTA.

In Figures 7, 8, and 9, the origin of a secondary branch from the aortic arch coincides with the ordinary disposition of the primary branches.

The origin of a secondary branch from the arch accompanying a diminution in the number of the primary branches is illustrated in figure 10.

In figure 11, it is seen to coexist with an increase in the number of the larger branches.

The instances recorded of two secondary branches arising directly from the aorta are very few. The figure 12 shows two such vessels, the internal mammary of the right side, and the vertebral of the left, in conjunction with the usual primary branches.

* The variety represented in this figure was observed by Tiedemann in the body of an eight months' fœtus which had hare-lip.

In figure 13, two secondary branches, the right and the left vertebral, are seen, with the four primary branches, to occupy the upper part of the arch.

The descent to the aorta—so to express the fact of their connexion with it—of the smaller arteries represented in the figures which have here been reviewed, is of very rare occurrence, with the exception of the left vertebral, as represented in figures 7 and 10.

The origin of the left vertebral from the aorta, in combination with the arrangement of the primary branches seen in the figures just referred to, is so often met with that, as has been previously stated, it is commonly considered to constitute the most frequent source of alteration from the usual arrangement of the branches of the arch, and when it takes its rise from the aorta, it is almost invariably placed between the carotid and subclavian of the left side.

In figure 8, the origin of the left vertebral artery occupies a very rare position *.

Figure 11 †.—The combination of a left vertebral with the four primary branches is not of very rare occurrence. I have seen two preparations in which the arrangement was the same as that presented in the figure before us. Koberwein ‡ describes a case which differs from that here represented in the circumstance of the right subclavian taking origin from the right side of the arch before the other branches.

* A preparation in which the left vertebral arose from the aorta in this very unusual situation, is mentioned by Walter :—"Arcus arteriæ aortæ, cera flava impletus, ex quo tres prodeunt trunci; primus, arteriam carotidem sinistram, dextram et subclaviam dextram, edit. Secundus est ipsa subclavia sinistra; tertius, vertebralis sinistra. Ex adulto."—Museum Anatomicum, p. 237. Berolini, 1805.

J. F. Meckel remarks, "Unter den vielen Fällen, die ich sahe, fand ich nur in einem einzigen die linke Wirbelarterie mehr nach aussen liegend, als die Schlüsselpulsader." Pathol. Anat. band ii. s. 109.

Tiedemann, from whose figure ours is copied, states that he observed the anomaly in the body of a man thirty years of age.

† This figure is taken from a drawing made of a preparation which is in the Museum of the Royal College of Surgeons in Ireland, by Mr. Kirwan, under the direction of my friend Professor Hart. It affords me much pleasure to acknowledge the great kindness with which Dr. Hart has consented to aid me by the inspection of the museums in Dublin, and the superintendence of any drawing which may be required.

‡ "Surgunt in nostro, ex arcu aortæ justo minori, carotis dextra solum et carotis sinistra, ex descendente dein ante vertebram dorsi secundam, vertebralis sinistra, infra hanc, subclavia sinistra, ante cartilaginem tandem vertebris tertiæ et quartæ intermediam, subclavia dextra."—De Vasorum decursu abnormi, &c.

Otto has given the description of a case previously referred to, in which the branches presented an arrangement that may be regarded as the reverse of that delineated in figure 11. The aorta arched to the right side; the primary branches arose separately, the left carotid being given first, and the left subclavian the last. The vertebral artery took its rise between the carotid and subclavian of the right side, and was distributed to that—the right side.

Figure 9.—The origin of a thyroid artery from the aorta is of very rare occurrence *; the only case which has fallen under my observation is represented in this figure.

In most of the examples recorded of this variety, the unusual artery was seen, as in the figure before us, to arise between the innominate and the left carotid. It was so placed in Neubauer's preparation, which is described and figured in the inaugural dissertation of his pupil Erdmann †. Nicolai saw the artery given from the aortic arch between the carotid and subclavian of the left side ‡, in the situation in which the vertebral takes its rise when derived from the aorta.

* It is difficult to account for the statement made in Bichat's Anatomy, that the thyroid artery arises from the aorta more frequently than the left vertebral does; the words are—"Quelquefois on a vu la vertebrale gauche naître immédiatement de l'aorte et former uu quatrième tronc primitif. Plus souvent on trouve une petite artère née de l'aorte entre l'innominée et la carotide gauche, et remontant verticalement sur la trachée pour aller se rendre à la glande thyroide."—Anatomie Descriptive de Xavier Bichat, tom. iv. p. 147; nouv. edit. Paris, 1829.

The error contained in this passage, for such it must be considered, is remarked on by Meckel (Handbuch der menschlich. Anatom., b. 3, s. 80).

The distinguished writer last referred to, has, iu his admirable work on Pathological Anatomy, fallen into the mistake of assigning six examples of the variety to the observation of one anatomist; "Hüber sahe sie sechsmal uumittelbar aus dem Bogen der Aorta entstehen." On consulting Hüber's Essay, I find that he does not make auy mentiou of a thyroid artery arising from the aorta, but that iu the page referred to by Meckel, he describes it as given from the innominate. "Singularem plane arteriam, altius paulum, quam dicta mox thymica, exire vidi ex innominata; incurvato, pro indole harum arteriarum, reptatu adscendentem et brevi itinere glandulæ thyroidis partem infimam adeuntem. In aliis cadaveribus (pluries enim illam observavi, bis in Goettengensi et quater Cassellano theatro Anatomico) &c. &c."—Observationes aliquot &c. in tbe Acta Helvet. vol. viii p. 83.

Tiedemann also, apparently following Meckel, gives the same reference to Hüber in his account of the variety now under observation.

† Descriptio Anatomica Arteriæ innominatæ et Thyroideæ imæ.—Jenæ 1772.

‡ Preterita tamen hyeme in theatro nostro anatomico, quatuor observavi ramos. Horum tres majores eo, ut descripsi, i. e. ordinario modo collocabantur, quartus vero diametri longe augustioris, inter carotidem et subclaviam siuistram ex ipso arcu emergens, ad glandulæ thyroideæ partem infimam flexuoso decursu properabat, &c.—De directione vasorum, &c. H. A. Nicolai, Argeutorati 1725, in Haller—Dissertat. Anatom. Select. vol. ii., p. 497.

The figure 12 is copied from that published by Boehmer *, of a case observed and prepared by Cassebohm.

One additional example of two secondary branches in conjunction with the ordinary condition of the larger arteries may be cited.—Meckel gives an account of a preparation, which differed from that delineated by Boehmer only in the circumstance of the right vertebral artery being given instead of the internal mammary †.

The 13th figure shows a most unusual condition of the vessels. Meckel and Tiedemann have each recorded a single instance of this variety. The figure is taken from that given in the "Tabulæ Arteriarum."

It may be said that this case is remarkable by several circumstances:—

1st. The primary branches arise separately.

2ndly. The right subclavian is given on the right side; when freed from the innominate that vessel is usually derived from the left side of the aorta.

3rdly. The left vertebral is conjoined to the unusual arrangement of the primary branches.

Lastly. The right vertebral, which arises from the aorta with extreme rarity, is here added to the list of deviations from the usual arrangement of the branches, furnished from the arch of the aorta.

* Observationes binas anatom. &c. in Haller Dissertat. Anatom. vol. ii. p. 451.

† "In einem Falle den ich vor mir habe, entspringen beide Vertebralarterien mit übrigens normaler Vertheilung der grossen Aeste aus dem Bogen, die rechte zwischen dem ungenannten Stamme und der linken Carotis, die linke zwischen dieser und der linken Schlüsselbeinarterie."—Ueber die Bildungsfehler des Herzens, Meckel in Reil's Archiv. für die Physiologie, band 6, p. 571. Halle, 1805.

THE CAROTID ARTERIES.

The following are a few of the abbreviations used in this table in addition to those previously explained :—

Th. or Thyr. for Thyroid ; H. for Hyoid ; Cart. for Cartilage.

The word "usual" implies that, on examination, the vessels seemed not to depart from the usual disposition to such an extent as to require comment.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
1	R		opposite the upper margin of the Thyroid Cartilage.		
	L		Th. Cart.	rises from Innominate.	
2	L		Th. Cart.	rises from Innominate.	
3	R	3½	opposite middle of Thyroid Cartilage.		
	L	4	opposite Cricoid Cart.		
4	R	4	Th. Cart.		
	L	5	Th. Cart.		
4a	R		Th. Cart.		
6	R		Th. Cart.		
	L	5	Th. Cart.		
7	R	3½	Th. Cart.		
	L	5	Th. Cart.		
8	R	3	Th. Cart.		
	L	4½	Th. Cart.		
9	R		Th. Cart.	rises from Innominate.	

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L		Th. Cart.		
9a	R		Th. Cart.		
	L		Th. Cart.		
9b	R		above Os Hyoides.		Lingl. and Facl. arise by a common trunk.
	L		Os H.		
9c	R		Th. Cart.		usual.
	L		Th. Cart.		usual.
10	R		Th. Cart.	gives Super. Thyroid.	
	L		Th. Cart.	arises from Innominate.	
12	R		Th. Cart.		
-	L		$\frac{1}{2}$ inch above Os H.		the ext. Carotid is directed almost horizontally backwards to behind the angle of the lower Maxilla, at which point all the Branches are given off together.
13	L		above Os H.	gives Super. Thyroid.	
13a	R		Th. Cart.		the Branches examined and presented nothing worthy of note.
	L		Th. Cart.		usual arrangement of the Brs.
13b	L		mid. Th. Cart.		the Laryngl. a separate br. fr. Ext. Car.
16	R		Os H.	a long, slend. artery (from Sup. Thyr.?) and a vein course down over the carotid.	
16	R		Os H.		Lingl. and Facl. rise by a common trunk. Other Brs. usual.
19	R		mid. Th. Cart.		usual.
19a	R		Th. Cart.		
	L		Th. Cart.		

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
19b	R		mid. Th. Cart.		
22	R		Th. Cart.		
23	R		Th. Cart.		
	L		Th. Cart.		
23a	R				Super. Thyr. sends a large br. over the Crico-thyroid membrane—other Brs. usual.
26	R		Th. Cart.		
	L		Th. Cart.		Super. Thyr. deficient; in its stead two small Brs., of which one is the Laryngl. br., the other is given to Sterno-Mast. muscle. The other Brs. present nothing remarkable.
28	R		Th. Cart.		usual.
29	R		Th. Cart.		usual.
	L		Th. Cart.		usual.
30	R		Th. Cart.		Lingl. and Facl. arise by one trunk. Other Brs. usual.
31	R		Th. Cart.		
	L		Th. Cart.		
31a	R		mid. Th. Cart.		Laryngl. br. given separately fr. Ext. Car. Lingl. and Facl. arise by one trunk. Infer. Palat. and Tonsil. brs. fr. Ext. Car. and joined at origin. The other Brs. usual.
31b	R		mid. Th. Cart.		Laryngl. a separate br. of Ext. Car. The other Brs. usual.
31c	R		½ inch above Os H.		
31d	R		Th. Cart.		
31e	R		higher than usual.		
	L		higher than usual.		
32	L		1 inch above Os H.		Laryngl. a separate br. of Ext. Car. The other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
33	R		Th. Cart.		
34	L		above Os H.	arises unusually close to Innominate, and gives Sup. Thyr.	
34a	L		1 inch above Os H.		
34b	L		mid. Th. Cart.		
38	R		Th. Cart.		Lingl. and Facl. arise by one trunk The other Brs. usual.
	L		Th. Cart.		Lingl. and Facl. by one trunk. The other Brs. usual.
38a	R		Os H.		Super. Thyr. gives a br. of considerable size over sheath of Com. Car.
38b	R		Th. Cart.		usual disposition of Brs.
	L		Th. Cart.		usual.
39	L		Th. Cart.		Laryngl. given from Ext. Car. Other Brs. usual.
40	R		Th. Cart.	arises in common with the Left Carotid: is crossed by Thyr. veins opp. mid. of Th. Cart.	Lingl. and Facl. fr. one trunk. Other Brs. usual.
41	L		Th. Cart.	arises in common with R. Carotid.	Ext. Car. divides into a lash of brs. opp. the angle of the lower Maxilla. Brs. in other respects usual.
42	R		above Th. Cart.	arises in common with left Carotid: gives the Infer. and the Super. Th. arteries.	
	L			arises in common with R. Carotid. See the Arch of Aorta.	
43	R		Th. Cart.		

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
44	R		Os H.		Thyr., Lingl. and Facl. arise by a common trunk. The other Brs. usual.
	L			fr. Innom.	
45	R		Th. Cart.		
	L			fr. Innom.	
46	R		lower margin of Th. Cart.	crossed at the end or division by Omohyoid muscle.	
47	R		below upper margin of Th. Cart.		
	L		above Th. Cart.		
47a	L		Th. Cart.		
50	R		Os H.		Lingl. and Facl. fr. a com. trunk. Infer. Palat. given from Ext. Car. Other Brs usual.
51	R		Th. Cart.		usual.
	L		Th. Cart.		usual.
52	R		Th. Cart.	Anter. jugular vein communicates over St. Mast. muscle with Ext. jugular, which is small.	Thyr. and Lingl. united into one trunk at their origin. Other Brs. usual.
	L		Th. Cart.	very close to Innom. at origin.	usual.
53	R		Th. Cart.		usual.
	L		Th. Cart.		usual.
54	R	$3\frac{1}{2}$	Th. Cart.		
	L	$5\frac{1}{2}$	Th. Cart.		usual.
55	R	$3\frac{1}{2}$	Th. Cart.	Anter. Jugr. vein large.	usual.
	L		Th. Cart.		usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
57	R	$3\frac{1}{2}$	above Th. Cart.		Occipl. gives the only Sterno-Mastoid br. Brs. usual.
	L		Th. Cart.		
58	R	$3\frac{1}{2}$	above Th. Cart.		Laryngl. a br. of Ext. Car.: greatest part of Occipl. runs superficially to the upper end of the St.-Mastoid muscle. Other Brs. usual.
	L	$4\frac{1}{2}$	Th. Cart.		usual.
59	R		Os H.		usual.
	L	5	Os H.		usual.
60	R		Th. Cart.		Facl. gives Sublingl. wh. follows Submaxilly. duct to the Sublingl. gland. The other Brs. usual.
61	R		Th. Cart.		Lingl. and Facl. arise by a com. trunk.
	L	$5\frac{1}{4}$	Th. Cart.		usual.
63	R	$4\frac{3}{4}$	Os H.		usual.
	L	6	Os H.		usual.
64	R	$3\frac{1}{2}$	mid. Th. Cart.		Lingl. and Facl. arise by a single trunk. Other Brs. usual.
65	R	4	Th. Cart.		A long interval betw. Thyr. and Lingl. Brs. usual.
	L			fr. Innom.	
66	R	4	above Th. Cart.		Laryngl. br. enters Larynx betw. Thyr. and Cric. cartilages. The Super. Lar. nerve enters in the usual situation. Sublingl. is a br. of Facl. The other Brs. usual.
	L		Th. Cart.		
67	L			fr. Innom.	
68	L		Th. Cart.		
69	L		above Th. Cart.		Th. Lingl. and Facl. arise very close one to the other fr. the beginning of Ext. Car. The other Brs. usual.
71	R		Os H.		Lingl. and Facl. arise by a single trunk. Thyr. rises higher than usual and descends to its destination. The other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
72	R	4	Th. Cart.		Lingl. and Facl. by a com. origin. Other Brs. usual.
	L	$5\frac{1}{4}$			Lingl. and Facl. by a com. origin. Trans. Facl., Int. Maxil., and Temp. arise together. Other Brs. usual.
73	R	$4\frac{1}{4}$	Os H.		Facl. arises above the angle of lower Maxilla and descends to usual position. The other Brs. usual.
	L	6	Os H.		Facl. arises opposite the middle of the Ramus Maxillæ Infer., and decends below its angle to usual situation. The other Brs. as usual.
74	R			Anter. jugular vein present.	
	L	$5\frac{1}{2}$	below upper margin of Th. Cart.	very close to Innom. at origin :—Anter. Jugular vein present.	A separate br. of Ext. Car. gives Infer. Palat. and Tonsill. The ouly Sterno-Mastoid br. fr. Occipl. Other Brs. usual.
75	R	4	Th. Cart.		usual.
	L	$5\frac{1}{2}$	Th. Cart.	very close to Innom. at origin.	usual.
76	R		Os H.		usual.
	L		Os H.	gives Super. Thyr.	Lingl. and Facl. by a com. origin. Other Brs. usual.
77	R	$3\frac{1}{4}$	Lower part of Th. Cart.		usual.
	L	5	below upper margin of Th. Cart.		usual.
78	R	5	Os H.		
	L	$6\frac{1}{2}$	Th. Cart.	Large Superficial veins (Ant. & Ext. Jugular.)	Laryngl. given fr. Ext. Car. Other Brs. usual.
81	R	$4\frac{1}{2}$	Os H.		Thyr., Lingl., Facl., Pharyngl. and Occipl. arise very close together fr. beginning of Ext. Car. The only Steruo-Mastoid br. is fr. Occipl. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L			the Super. Thyr.	Pharyngl. gives Palat. Other Brs. usual.
82	R	$4\frac{3}{4}$	Os H.		Large Sterno-Mastoid br. Other Brs. usual.
	L	6	a little above Os H.	its origin touches that of Innom.	Occipl. arises $1\frac{1}{2}$ inch. above Facl., and gives Poster. Auricr. Other Brs. usual.
83	R	$3\frac{1}{2}$	Th. Cart.		Lingl. and Facl. arise by a com. trunk. Other Brs. usual.
	L	$5\frac{1}{2}$	Os H.	fr. Innom.	Lingl. and Facl. fr. a com. origin. Poster. Auricr. fr. Occipl. Other Brs. usual.
84	R	4	Th. Cart.		Super. Thyr. and Lingl. arise by a com. trunk. Other Brs. usual.
	L	6	Os H.	fr. Innom.	Laryngl. is given as a separate br. of Ext. Car. The origin of Post. Auricr. much higher than ordinary. The other Brs. usual.
86	R	$3\frac{1}{8}$	below upper margin of Th. Cart.		Three small separate brs. instead of Super. Thyr. Other Brs. usual.
	L	$4\frac{1}{4}$	a little below upper margin of Th. Cart.	fr. Innom.	Thyr. of large size. Lingl. and Facl. given fr. a com. origin. Laryngl. and Palat. are given each separately from Ext. Car. Other Brs. usual.
88	R	4	a little above Th. Cart.		Lingl. and Facl. by common origin. Laryngl. arises separately from Ext. Car. The only Sterno-Mastoid from Occipl. Other Brs. usual.
	L	$5\frac{1}{4}$	Os H.	gives Super. Thyr. at bifurcation.	Sterno-Mastoid br. from Ext. Car., and has 9th nerve winding round it. 2 small Pharyngl. brs., one fr. Ext. Car., the other fr. Occipl. Other Brs. usual.
89	R	3	mid. Th. Cart.	fr. Innom. gives Super. Thyr.	
	L	$4\frac{1}{2}$	Th. Cart.	has close behind it the Left Vert., which is 4 inches long.	The only Sterno-Mastoid br. is fr. Occipl. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
90	R	4	Os H.		usual.
	L	6	Os H.		Lingl. and Facl. by a com. origin.
91	R	4	above Th. Cart.		usual.
	L	4¾	Th. Cart.		Lingl. and Facl. fr. a com. trunk of origin.
92	R	3	Th. Cart.		distance between Super. Thyr. and the next brs. 1 inch. Lingl. and Facl. close at their origin. Other Brs. usual.
	L	5	Os H.	Super. Thyr. given at the bifurcation.	space between Brs. as on R. side. Lingl., Facl. and Occipl. close together at their origin. Other Brs. usual.
93	R		Th. Cart.	Super. Thyr. given at the bifurcation.	Lingl. and Facl. arise by a com. origin.
94	R	3½	a little below upper margin of Th. Cart.		Laryngl. a separate br. of Ext. Car.
	L		Th. Cart.		usual.
96	R	4¼	Th. Cart.		usual.
	L	4½			nearly usual.
97	R	3½	below upper margin of Th. Cart.		Laryngl. a separate br. of Ext. Car. Lingl. and Facl. by a common origin—rather the former given from the latter. A small artery given fr. Ext. Car., in the usual position of the Lingual, ramifies over the Mylo-hyoid muscle (it corresponds to Hyoid br. of Lingl.?)
	L		below upper margin of Th. Cart.	gives Super. Thyr.	Laryngl. a separate br. of Ext. Car. Other Brs. usual.
98	R	4¾	above Os H.	gives Pharyngl. in the bifurcation.	the Brs. given close to origin of Ext. Car. Super. Thyr. and Lingl. descend to their destination. Brs. in other respects usual.
	L	6¼	above Os H.	gives Pharyngl. in the bifurcation.	arrangement of Brs. same as on the right side.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
99	R	3¾	Os H.		Regular intervals between the Brs. at their origin, but considerable space between the terminal Brs. and those below : in other respects usual.
	L	5		the Super. Thyr.	usual.
100	R	3½			usual.
	L	5	Th. Cart.		nearly usual.
101	R	4		the Super. Thyr.	usual.
	L	5	Os H.	gives a small Super. Thyr. and a separate Laryngl. br.	usual.
102	R	3½	Th. Cart.		Pharyngl. and the only Sterno-Mastoid br. fr. Occipl. Other Brs. usual.
	L		Th. Cart.	joined to Innom. at its origin. Pharyngl. fr. the bifurcation.	
104	R	3¾	above Th. Cart.		Lingl. and Facl. by a com. origin. Other Brs. usual.
	L	5¾			Lingl. and Facl. arise by a com. trunk. Other Brs. usual.
105	L	5¾		given from Innom.	usual.
106	R	4	Th. Cart.		St.-Mastoid a separate br. of Ext. Car. Post. Auricr. arises close to the terminal brs. Other Brs. usual.
	L		Th. Cart.		usual.
107	R		Th. Cart.		nearly usual.
	L			the Super. Thyr.	Laryngl. given separately from Ext. Car. Other Brs. usual.
110	R	4	Th. Cart.		Thyr. very small. Facl. gives a large Palat. br., which supplies deficiency of a small Pharyngl. Occipl. continued from the "cervicalis ascendens" (br. of the Infer. Thyr.) Other Brs. nearly usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L			very close to Innom. at origin.	
111	R	4	Th. Cart.		The Brs. arise at regular intervals, and are nearly as usual in their distributions.
	L	5	Os H.	the Super. Thyr.	5 Brs., viz. Lingl., Facl., Pharyngl., Sterno-Mast., and Occipl., arise close to origin of Ext. Car. A second Sterno-Mast. br. fr. Occipl. Palat. br. of Facl. large, and does not pass between the Stylo-Gloss. and Stylo-Pharyng. muscles.
112	R	4½	Os H.		Thyr., Lingl., Facl. and Occipl. arise close to beginning of Ext. Cart. Post. Auricr. arises in mid. of interval between the preceding and the two terminal brs.
	L			very close to Innom. at origin.	
113	R	4½	Th. Cart.		Lingl. and Facl. by a com. origin. Other Brs. nearly usual.
	L	5			Lingl. and Facl. by one origin. Other Brs. nearly usual.
114	R				The only St.-Mastoid br. is given fr. Occipl. Other Brs. usual.
	L	5	a little above Th. Cart.		Thyr. unusually small. Lingl. and Facl. by one origin. Only St.-Mastoid br. is fr. Occipl. Pharyngl. fr. Intern. Carotid.
115	R	4½			The Brs., except the Post. Auricr. and the terminal ones, arise close to the beginning of Ext. Car. Lingl. and Facl. fr. a com. origin. St.-Mastoid a separate br. of Ext. Car.
116	R	3½	below upper margin of Th. Cart.		Occipl. and Pharyngl. arise considerably higher than usual; the former gives P. Auricr.
	L	4½	Th. Cart.		same arrangement as on the right side.
117	R	4½	Os H.		Occipl. gives Pharyngl. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L	5		gives Pharyngl. from bifurcation.	Laryngl. a separate br. of Ext. Car. Occipl. arises fr. beginning of Ext. Car. and gives P. Auricr. In other respects the Brs. usual.
118	R		Th. Cart.		usual.
	L		Th. Cart.		Lingl. and Facl. by one origin. Other Brs. nearly usual.
120	R	4			Occipl. and Pharyngl. by a com. trunk fr. Intern. Carotid. Other Brs. usual.
121	R	$4\frac{1}{2}$			
122	R	$3\frac{3}{4}$			2 Super. Thyroid brs. of equal size arise close one to the other, and both arch downwards in the same way as the single Br. usually does.
	L		mid. Th. Cart.		nearly usual.
123	L	$5\frac{1}{2}$			
124	L				Thyr. very small. 2 small unusual Brs. arise close to it, (their destination is not noted). Other Brs. usual.
127	R		Os H.		
	L			the Super. Thyr.	Occipl. arises much higher than usual and gives Post. Auricr. Other Brs., except the terminal, arise close to the beginning of Ext. Car.
129	R	$4\frac{1}{4}$	Th. Cart.		nearly usual.
	L	$5\frac{1}{2}$	Th. Cart.	rises lower than usual on the Arch of Aorta, and close to the Innom.	Thyr. given immediately at the origin of Ext. Car. Lingl., Facl. and Occipl. 1 inch higher. Pharyngl. fr. Occipl.
131	R	3	opposite the Cricoid Cart.		Thyr. arises one inch above Com. Car. The other Brs. are given in succession at considerable intervals.
	L	$4\frac{1}{2}$	opposite the Cricoid Cart.	the origin is very close to that of Innom.	Brs. arise at a considerable distance fr. the beginning of Ext. Car.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
135	R		above Th. Cart.		Sterno-Mastoid hr. given separately fr. Ext. Car. Sublingl. hr. arises fr. Facl., and perforates the Mylo-Hyoid muscle. Occipl. superficial to Trachelo-Mastoid muscle, and perforates the Splenius and Sterno-Mastoid near their inner or posterior margins. Other Brs. usual.
	L		Os H.	the Super. Thyr.	
136	R	$4\frac{1}{4}$		Th. Cart.	usual.
	L	6		above Th. Cart.	Ext. Car. passes between Digastric and Stylo-Hyoid muscles—covered by former, superficial to the latter. The Brs. arise at considerable intervals one from the other; in other respects they are nearly as usual.
137	R			given fr. the Arch of Aorta.	
	L	$4\frac{1}{2}$	Os H.		
138	R	4			Sterno-Mastoid hr. fr. Ext. Car. Occipl. rises near the upper end of Ext. Car. Other Brs. usual.
139	R		Th. Cart.		
	L			joined to Innom. at origin.	Occipl. rises much higher than usual, close to Post. Auricr. Other Brs. usual.
140	R				Occipl. gives Pharyngl. and Post. Auricr. Other Brs. usual.
142	R	$4\frac{3}{4}$		$1\frac{3}{4}$ inch in length of the artery is contained within the Thorax.	Pharyngl. given fr. Intern. Car.—Intern. Maxilly. under Ext. Pterygoid muscle. Other Brs. usual.
144	R	$3\frac{1}{2}$	Th. Cart.		usual.
	L			joined to Innom. at origin, which is lower than usual on the Arch of the Aorta.	
145	R	$4\frac{1}{2}$		the origin is situated within the Thorax.	Pharyngl. given fr. Intern. Car. Intern. Maxilly. under the Ext. Pterygoid muscle. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L	$5\frac{3}{4}$			
146	R		Th. Cart.		Lingl., Facl., Occipl. and Pharyngl. arise at a considerable distance above the Super. Thyr. The Brs. in other respects usual.
	L		Th. Cart.		Brs. as on the right side.
147	R		Th. Cart.		usual.
	L		Th. Cart.		usual.
149	L				usual.
150	R		Th. Cart.		Thyr. arises at beginning of Ext. Car. as usual. Lingl., Facl., Occipl. and Pharyngl. are given close together, 1 inch higher. Post. Auricr. and terminal Brs. usual.
	L		Th. Cart.	the origin is very close to Innom. & to L. Subclav.	nearly usual.
151	R	$3\frac{1}{2}$	Th. Cart.		usual.
	L	5	Th. Cart.	origin is joined to Innom.	
152	R	4	Th. Cart.		Occipl. arises higher than usual and gives Post. Auricr. Other Brs. usual.
	L				Sublingl. fr. Facl. Pharyngl. arises above Occipl., and at distance of $1\frac{1}{4}$ inch from the Com. Car. Other Brs. usual.
153	L				Instead of a Post. Auricr. br. a small artery is given, wh. enters the Stylo-Mastoid foramen. Pharyngl. arises fr. Occipl. Other Brs. usual.
154	L	$5\frac{1}{2}$	above Os H.		no Pharyngl. artery. Other Brs. usual.
155	R		Th. Cart.		usual.
	L			joined to Innom. at origin.	
156	R		Th. Cart.		usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
158	R & L			both arise by a common origin from the Arch of the Aorta.	
159	L			arises from Innom. & at the distance of a third of its length fr. the beginning of this.	Thyr., Lingl., Facl., Occipl. and Pharyngl. arise fr. the commencement of Ext. Car. Post. Auricr. midway to its end. In other respects Brs. usual.
160	L	6	Os H.		nearly equidistant in their origin. In other respects nearly usual.
162	R		Th. Cart.		
	L	5	Th. Cart.	close to Innom. at origin.	Thyr. unusually small; so is the Thyr. body. Other Brs. usual.
163	R	$3\frac{1}{4}$	Th. Cart.	given from a long Innom.	
	L	$5\frac{1}{4}$	Th. Cart.		
169	R		Th. Cart.		Lingl. and Facl. by a com. origin. Other Brs. usual.
171	L		Os H.	the Super. Thyr.	usual except absence of Super. Thyr.
171 a (fem. adt.)	L		Th. Cart.	Com. Car. is covered by intern. jugular vein, except a small portion of its up. end. The Omohyoid muscle is membranous in its anterior half.	Brs. nearly usual.
172	R	4	Th. Cart.		
	L	6	Th. Cart.	the origin is close to Innom. and to the L. Subclav.	Occipl. rises near beginning of Ext. Car. and gives Post. Auricr. Considerable intervals between the origins of Thyr., Lingl. and Facl. The Brs. in other respects usual.
173	R	$4\frac{1}{4}$	Os H.		
173 a	R	$4\frac{1}{2}$	Th. Cart.		Lingl. and Facl. are very close at their origin. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L			the origin is close to Innom. and to the L. Subcl.	
174	R	$3\frac{7}{8}$	Th. Cart.		Lingl. and Facl. very close at their origin. Brs. usual.
	L	$4\frac{1}{2}$	Th. Cart.		nearly usual.
176	R	$3\frac{3}{4}$	Th. Cart.		Infer. Palat. a separate br. of Ext. Car. Other Brs. nearly usual.
	L		Th. Cart.	gives Pharyn. at bifurcation.	Lingl. and Facl. by one trunk of origin, which is close to Thyr. and Pharyngl. Other Brs. usual.
177	L	$4\frac{3}{4}$		gives Pharyn. at bifurcation.	usual.
178	R	$2\frac{3}{4}$	lower part of Th. Cart.		Ext. Car. measures 3 inches. Lingl. and Facl. by a com. origin, which, with Pharyngl. and Occipl., arise close together at $\frac{1}{4}$ inch from beginning of Ext. Car. Brs. in other respects usual.
	L	$4\frac{1}{4}$	lower part of Th. Cart.	joined to Innom. or given fr. it; gives Super. Thyr.	Ext. Car. measures 3 inches; at 1 inch from its commencement arise the Lingl. and Facl., (by a com. trunk) with the Occipl., Palat., Pharyngl., and a Muscular br.,—all close together. Post. Auricr. fr. Occipl.
179	R	$3\frac{3}{4}$	Th. Cart.		Ext. Car. $2\frac{3}{4}$ inches in length. Thyr., Lingl., Facl., Occipl. and Post. Auricr. arise at nearly equal distances one fr. the other. Pharyngl. fr. Occipl.
	L			very close to Innom. at origin.	
180	R		Th. Cart.		Ext. Car. $2\frac{1}{2}$ inches long. Thyr. given at beginning of Ext. Car. as usual. Lingl., Facl., Occipl. and Pharyngl. arise all together 1 inch higher up. Stylo-Mastoid br. of Post. Auricr. larger than the continued vessel. 2 Pharyngl. brs., the second given by Occipl.
	L				Ext. Car. $2\frac{1}{4}$ inches in length. Brs. same as on opposite side, except that Occipl. does not give a Pharyngl. br. and Post. Auricr. is disposed as usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
181	R	$5\frac{1}{2}$		the Super. Thyr.	Ext. and Int. Carotids very tortuous. Ext. Car. 2 inches long. Lingl., Facl. (given fr. a com. origin), Palat. and 2 Pharyngl. brs. arise fr. beginning of Ext. Car. Post. Auricr. fr. the beginning of Occipl.
	L				Ext. Car. measures $2\frac{1}{4}$ inches, and is superficial to Stylo-Hyoid muscle. Thyr., Lingl., Facl. and Occipl. given close to origin of Ext. Car. Brs. in other respects usual.
182	R	5	Os H.		Ext. Car. $2\frac{1}{4}$ inches long. It gives Thyr., Lingl., Facl., Pharyngl. and Occipl. in succession within $\frac{3}{4}$ inch of origin. The other Brs. and the distribution usual.
	L		Th. Cart.	inclines from Innom., near wh. it arises, towards L. Subclav., and is unusually close to that artery as far as the upper margin of the Thorax.	usual.
183	R		Os H.		Ext. Car. $2\frac{1}{4}$ inches long. Thyr., Lingl., Facl., Occipl. and Pharyngl. arise all within $\frac{1}{4}$ inch fr. beginning of Ext. Car. Post. Auricr. midway higher up.
	L		Os H.		Brs. very nearly as on the right side 2 Palat. brs., one from Facl., as usual, the other fr. Lingl.
184	R				Ext. Car. 3 inches long. Thyr., Lingl., Facl. and Occipl. arise within 1 inch fr. beginning of Ext. Car. Pharyngl. given fr. Int. Car. Other Brs. usual.
	L				the Brs., except the Post. Auricr. and the terminal ones, arise fr. Ext. Car. within $\frac{3}{4}$ inch of its origin.
185	R	$3\frac{3}{4}$	Th. Cart.		Ext. Cart. $2\frac{1}{4}$ inches long. It gives 2 Super. Thyr., a separate Laryngl., Lingl., Facl., Occipl. and Pharyngl., all within $\frac{3}{4}$ inch of its origin. Post. Auricr. rises beyond the preceding brs., midway to end of Ex. Car. The Thyr. brs. are of nearly equal size, and both arch downwards and supply the Thyroid body; the lower one furnishes brs. to the muscles.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L		Th. Cart.	rises very close to Innom. and gives Super. Th.	Lingl., Facl., Occipl. and Pharyngl. arise together at $\frac{3}{4}$ inch from origin of Ext. Car. P. Auricr. as usual.
186	R		Os H.		Ext. Car. $2\frac{3}{4}$ inches long. Thyr., Lingl., Facl., Occipl. and Pharyngl. arise at intervals within $1\frac{1}{2}$ inch fr commencement of Ext. Car. Post. Auricr. fr. Occipl.
	L		Th. Cart.		Ext. Car. $2\frac{3}{4}$ inches long. The Brs., except the terminal ones, given at intervals within $1\frac{1}{4}$ inch of the origin of the Ext. Car. Thyr. and Lingl. arise by a common origin.
187	R			very close to R. Subclav. for some distance from origin; gives Super. Thyr.; all the arteries are much curved.	Ext. Car. $2\frac{1}{4}$ inches long. Lingl. and Facl. by a com. origin. Other Brs. usual.
	L			the Super. Thyr.	Ext. Car. 2 inches in length. Lingl., Facl., Occipl. and Pharyngl. given very close one to the other. Brs. in other respects usual.
188	R				Ext. Car. $2\frac{1}{2}$ inches long. Thyr., Lingl., Facl., Occipl. and Pharyngl. arise within $\frac{1}{2}$ an inch fr. origin of Ext. Car. In other respects the Brs. are usual.
	L				Ext. Car. $2\frac{1}{2}$ inches long. Thyr., Lingl., Facl., Occipl. and Pharyngl. arise within $\frac{1}{2}$ inch of beginning of Ext. Car. P. Auricr. $1\frac{1}{2}$ inch higher.
191	R			the Super. Thyr.	Ext. Car. $3\frac{1}{2}$ inches in length. Lingl., Facl., Occipl. and Pharyngl. given together at 1 inch fr. origin of Ext. Car. Lingl. and Facl. by a com. origin. Palatine is a separate br. of Ext. Car. In other respects Brs. usual.
	L			arises fr. Innom; gives Super. Thyr.	Ext. Car. $3\frac{1}{2}$ inches long. Lingl. and Facl. arise by a com. trunk. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
192	R				Ext. Car. 2 inches long and divides lower than usual. Thyr. small. Lingl., Facl., Pharyngl. and Occipl. arise close one to the other, at 1 inch distance fr. beginning of Ext. Car. Post. Auricr. arises with the terminal brs. Trans. Facl., of large size, springs from the Temporal 1 inch above the Intern. Maxillary, and inclines downwards and inwards over the Masseter muscle to supply the upper lip and side of the nose. Facl. ends in the lower lip.
	L		Os H.	gives Super. Thyr. and Laryngl. separately.	Ext. Car. $2\frac{1}{2}$ inches long. Lingl., Occipl. and Pharyngl. arise at the distance of $\frac{1}{2}$ inch above the Com. Car. Facl. at 1 inch. Post. Auricr. arises still higher, as usual. Trans. Facl. is given at the end of the Ext. Car., and, as on the right side, supplies the upper lip and the nose instead of the Facl., which does not ascend so far.
193	R			the Carotid partly covers the R. Subcl. near the origin.	Ext. Car. $2\frac{1}{2}$ inches long. The Branches arise at considerable intervals one from the other; may be said to be diffused over the parent vessel. The origin of the Facl. is higher than usual, and close to the Post. Auricr. Brs. in other respects usual.
	L			Pharyngl. is given fr. the bifurcation.	Thyr., Laryngl., Lingl. and Occipl. are given close together fr. the origin of Ext. Car. In other respects Brs. usual.
194	R	$4\frac{1}{4}$	Th. Cart.		Ext. Car. $2\frac{1}{4}$ inches in length; tortuous. Thyr. and Occipl. arise at distance of $\frac{1}{4}$ inch above Com. Car. Lingl. and Facl. by a com. trunk above preceding. Pharyngl. is given fr. Occipl. Other Brs. usual.
	L				Ext. Car. gives no brs. except at its upper and lower ends. Thyr., Lingl., Facl. and Occipl. arise close to the Com. Car. Lingl. and Facl. are given fr. a com. trunk, to the beginning of wh. the Thyr. is joined. Ext. Car. divides into Post. Auricr. Templ. and Int. Maxillary.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
195	R		Th. Cart.	the artery for an inch from its origin covers, or lies anteriorto,the R. Subclav.	Ext. Car. 2¾ inches long. Thyr. is larger than usual, and sends a thick br., which crosses obliquely over the Crico-Thyr. membrane to the opposite side of the Thyr. body. Lingl., Facl., Occipl. and Pharyngl. are 1 inch distant from Com. Car. in their origins, which are all close together. Post. Auricr. usual.
	L		Th. Cart.	rises from Innom. & gives Super. Thyr.	Facl., though of good size, is expended chiefly below the Inferior Maxilla. Other Brs. nearly usual.
196	L			the Super. Thyr.	Ext. Car. 2⅛ inches in length. Lingl., Facl. and Occipl. arise close together at distance of ½ inch fr. Com. Car. P. Auricr. higher in origin, as usual. Brs. in other respects usual.
197	L		Th. Cart.		Ext. Car. measures 2½ inches. The Branches are given at considerable intervals one after the other, and present the usual disposition in their distribution.
198	R		Os H.	gives Super. Thyr. at junction with Ext. Car.	Ext. Car. 2¼ inches in length. Brs. usual.
198a	L			at its origin is closer to L. Subclav. than to Innom.	Intern. Maxillary arises by a com. trunk with Facl. Other Brs. usual.
199	R			almost completely covers the R. Subcl. for some distance above Innom.	Ext. Car. 2¾. Lingl. gives Palat. artery. 2 Pharyngl. (one is given fr. bifurcation of Com. Car., the other ½ inch higher up). Other Brs. usual.
	L				Ext Car. 2¼ long. Lingl., Facl., Occipl. and Phar. arise close one to the other at the distance of ½ inch fr. Com. Car., close to wh. is the origin of Thyr., as usual. Post. Auricr. usual.
200	R				Ext. Car. measures 3 inches. Thyr. very small. Lingl. and Facl. by a com. origin. The foregoing, with Pharyngl. and a muscular br., arise within the space of ½ inch fr. Com. Car. Occipl. at 2 inches fr. same, and gives Post. Auricr.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
201	R		Th. Cart.		the Brs. arise at considerable intervals one fr. the other. The origin of Thyr. higher than usual. Brs. in other respects usual.
	L		Th. Cart.		Brs. nearly usual.
202	R		Th. Cart.		
	L		Th. Cart.		Ext. Car. $2\frac{1}{4}$ inches long. 2 small Pharyngl. brs. Thyr., Lingl., Facl. and Post. Auricr. usual.
202a (male adt.)			Os H.	the com. Car. is altogether covered in the neck by the Intern. jug. vein; and the Vagus also lies on or anterior to it for the greater part of its extent.	
203	R			covers origin of R. Subcl. and is crossed by a br. from infer. Thyr., wh. also gives the usual Th. artery behind the Com. Car.	Ext. Car. $2\frac{1}{4}$ inches in length. Thyr. and Lingl. usual—former is small. Facl., Occipl. and Pharyngl. are given at distance of 1 inch fr. Com. Car. P. Auricr. usual.
	L		Th. Cart.	arises fr. Innom.	
204	R			partly covers the beginning of R. Subclav.	Ext. Car. $2\frac{1}{2}$ inches long. Thyr., Lingl., & Post. Auricr. usual; Facl., Occipl., and Pharyngl. arise together at $\frac{3}{4}$ inch distance from Com. Car.
	L		Th. Cart.		Ext. Car. measures $2\frac{3}{4}$ inches in length. Thyr., Lingl., Facl. and Post. Auricr. usual. Occipl. arises in bifurcation of the Com. Car. and gives Pharyngl.
205	R		Th. Cart.		Brs. usual.
	L		Th. Cart.		Thyr. very small. Other Brs. usual.
206	R		Th. Cart.		Ext. Car. $2\frac{1}{2}$ inches long. Thyr., Lingl. and Post. Auricr. usual. Facl., Occipl. and Pharyngl. arise $\frac{1}{2}$ inch above Com. Car.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L		Th. Cart.		Ext. Car. $2\frac{3}{4}$ inches in length. The Brs. as on R side, except Post. Auricr., which arises higher than usual.
207	R		a little above Th. Cart.		Ext. Car. $2\frac{1}{2}$ inches long. Lingl. and Facl. given fr. a com. origin. Other Brs. usual.
	L				Ext. Car. 3 inches in length. Greater space than usual between the beginning of Ext. Car. and the origin of brs.
208	R		Th. Cart.		Ext. Car. nearly $2\frac{1}{2}$ inches long. Thyr. usual. Lingl., Facl., Occipl. and Pharyngl. arise together $\frac{1}{2}$ inch above Com. Car. (two first by a com. trunk). Post. Auricr. as usual.
	L				the Brs. are given at considerable intervals one from another.
209	R		Th. Cart.		Ext. Car. $2\frac{1}{4}$ inches long. Thyr., Lingl. and Post. Auricr. usual. Facl., Occipl. and Pharyngl. arise close together at 1 inch distance fr. Com. Car.
	L				Ext. Car. measures less than 2 inches. The Brs. nearly usual.
210	R		Th. Cart.		Thyr., Lingl. and Post. Auricr. usual. Facl. ends as lateral nasal. The origin of Occipl. is higher than nsual. 3 Pharyngeal and a Sterno-Mastoid br. are given separately fr. Ext. Car. Intern. Maxillary under Ext. Pterygoid muscle.
	L		Th. Cart.	the Super. Thyr.	Intern. Maxillary under Ext. Pterygoid muscle. Other Brs. usual.
211	R		Th. Cart.	partly covers the beginning of the R. Subcl.	Ext. Car. $2\frac{3}{4}$ inches long. Thyr. usual. Lingl., Facl. and Occipl. take origin higher than usual. The last named is close to Post. Auricr., which is given in the usual situation. 2 small Pharyngl. brs. fr. Ext. Car.
	L		Th. Cart.	the Super. Thyr.	Ext. Car. measures $2\frac{1}{4}$ inches. Lingl., Facl., Occipl. and Post. Auricr. usual. Pharyngl. of large size fr. Int. Car. Trans. Facl. fr. end of Ext. Car.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
212	R		Th. Cart.		Ext. Car. $2\frac{3}{4}$ inches long. Brs. usual, except Pharyngl., which arises at a distance of $1\frac{1}{2}$ inch fr. Com. Car.
	L		Th. Cart.		Ext. Car. $2\frac{3}{4}$ inches long. Brs. usual.
213	L			arises close to L. Subclav. and at distance of 1 inch fr. Innom.	
214	R		Th. Cart.		Ext. Car. 3 inches long. The Brs. separated by large intervals at their origin.
	L			the Super. Thyr.	Lingl. and Facl. arise above Occipl., at the distance of $1\frac{1}{8}$ and $1\frac{1}{2}$ inches fr. Com. Car.
215					Ext. Car. $2\frac{1}{8}$ inches in length. Thyr., Lingl. and Facl. arise immediately fr. beginning of Ext. Car.
216	R		Th. Cart.		Ext. Car. $3\frac{1}{4}$ inches long. Thyr., Lingl. and Facl. usual. Occipl. gives Pharyngl. Post. Auricr. arises within $\frac{1}{2}$ inch of upper end of Ext Car., and approaches Occipl. on the Scull.
	L		usual.		all except Post. Aurier. and the terminal brs. arise fr. the beginning of Ext. Car. Lingl. and Facl. by one trunk. 3 small Pharyngl., one of which is given at bifurcation of Com. Car. Occipl. is superficial to the Trachelo-Mastoid muscle.
217	R		Os H.	the Super. Thyr.	Ext. Car. has the Stylo-Hyoid muscle under it. The Brs. arise close to the origin of the parent vessel, except the Post. Aurier. and the terminal brs.
	L			the origin is close to Innom., and at greater distance than usual from L. Subclav.	

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
218	R		Th. Cart.	gives Super. Thyr., of wh. a large br. is directed to the opp. side over the Crico-Th. membrane.	Lingl. and Facl. are given fr. a com. origin. Laryngl. is a separate br. of Ext. Car. Facl. gives an unusually large Infer. Labial br. Temporal furnishes a large br. over the orbit. In other respects Brs. usual.
219	R		usual.		Thyr., Lingl., Facl. and Occipl. are given immediately at origin of Ext. Car. Three first nearly joined together. Other Brs. usual.
	L		higher than usual.		Ext. Car. 2 inches in length. Brs. usual.
220	R		usual.	gives Super. Thyr.	Ext. Car. 3 inches long. Brs. usual, except absence of Thyr.
	L		usual.		Ext. Car. $2\frac{3}{4}$ inches long. Lingl. and Facl. arise close together at distance of 1 inch above Com. Car. Occipl. and Phar. at $\frac{1}{2}$ inch distance fr. same. Other Brs. usual.
221	L			fr. Innom.	
222	L		usual.		Ext. Car. $2\frac{1}{4}$ inches long. Thyr. is very small. Laryngl. arises separately fr. Ext. Car. above preceding. Lingl. and Facl. given fr. a com. trunk, which, with Occipl., Pharyngl. and a Hyoid br., arise close together at 1 inch distance above Com. Car. Post. Auricr. usual.
223	R		usual.		Thyr. and P. Auricr. usual. Lingl. and Facl. arise by a com. trunk. Occipl. gives Pharyngl. Palat. is a separate br. of Ext. Car.
	L	$4\frac{1}{2}$	above Thyr. Cart.		Thyr. small (the Infer. is larger than usual). Lingl. and Facl. are close in their origin. Laryngl. is given separately fr. Ext. Car. Intern. Maxillary under the Ext. Pterygoid muscle.
225	R		usual.	gives Super. Thyr.	Ext. Car. $2\frac{1}{4}$ inches long. Lingl. and Facl. given by a com. origin. Other Brs. nearly usual.
	L				Ext. Car. $2\frac{3}{4}$ inches long. The Brs. arise at considerable intervals, and in other respects present the usual arrangement.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
226	R	4½	Os H.		Ext. Car. 2½ inches long. Sterno-Mastoid br. given fr. Ext. Car. The Brs. usual.
227	R		Os H.		Lingl. and Facl. rise higher than usual and descend to their destination. Occipl. is directed backwards beneath the trans. process of the first Cervical Vertebra. Intern. Maxillary is under Ext. Pterygoid muscle, close to Infer. Maxillary division of the 5th nerve.
	L				On this side the Intern. Maxillary is superficial to Ext. Pterygoid muscle.
228	R				Facl. supplies the Sublingl. gland. Other Brs. usual.
230	R	3¾	above the Th. Cart.		Ext. Car. measures 2½ inches. Laryngl. arises fr. Ext. Car. above Thyr.; Occipl. gives Pharyngl. Intern. Maxilly. under Extern. Pterygoid muscle. In other respects the Brs. are as usual.
233	R				Thyr. smaller and its deficiency supplied by the Infer. Thyr. Laryngl. arises fr. Ext. Car. Pharyngl. fr. Occipl.
	L		close to Os H.		2 Thyroid brs., which are smaller than the Inferior. Laryngl. is a separate br. of Ext. Car. Occipl. gives Pharyngl.
234	R		above Th. Cart.	rises in common with L. Car.	Lingl. and Facl. given fr. a com. origin. Occipl. is continued from the ascending cervical br. of the Infer. Thyroid.
	L		Os H.	rises by a trunk common to it, and R. Car.; gives Super. Thyr.	Int. Maxillary under Ext. Pterygoid muscle: on the right side it is over or superficial to that muscle. Other Brs. usual.
235	R		above Th. Cart.		Lingl. and Facl. fr. a com. trunk, the former ends at the side of the nose. Pharyngl. and Infer. Palat. arise as separate brs. of Ext. Car. at the distance of ¼ inch fr. the Com. Car. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L			fr. Innom.	
236	L		Th. Cart.	close to Innom. and to L. Subclav. at origin.	Ext. Car. $2\frac{3}{8}$ inches long. Laryngl. is very small and rises fr. Ext. Car. Occipl. and Pharyngl. are slightly joined at their origin. Other Brs. usual.
237	R		Th. Cart.	gives Pharyn. in the bifurcation.	Occipl. rises higher than usual and give Post. Auricr. Other Brs. usual.
238	R		Os H.		Thyr. very small. Facl. ends at the side of the nose, and is assisted by the Intern. Maxillary. In other respects the Brs. usual.
240					Occipl. gives Pharyngl. The other Brs. usual.
241	R		above Th. Cart.	arises within the chest.	Brs. usual.
242	R		Th. Cart.		Ext. Car. $3\frac{1}{4}$ inches long. Pharyngl. fr. Occipl. Other Brs. usual.
244	R		opposite the Cricoid cartilage.		
	L		opposite the Cricoid cartilage.		
245	R		usual.		Occipl. arises fr. Intern. Carotid and gives Pharyngl. Brs. nearly usual in other respects.
246	R		usual.		Facl. is smaller than ordinary. Infer. Palat. is given fr. Ext. Car. Other Brs. usual.
	L		usual.		Thyr. very small. Lingl. and Facl. by a single trunk of origin. Palat. arises separately fr. Ext. Car.
247	R	$3\frac{1}{2}$	below upper margin of Th. Cart.	covers or lies anterior to R. Subclav. after origin.	Ext. Car. $2\frac{1}{2}$ inches long. Pharyngl. absent. Palat. a separate br. and runs between the Stylo-Glossus and Stylo-Pharyngeus muscles.
	L		usual.		usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
248	R	$3\frac{1}{2}$	Th. Cart.		Ext. Car. $2\frac{1}{2}$ inches long. Lingl. and Facl. arise by a com. trunk. Thyr., Pharyngl., Occipl. and Post. Auricr. usual. Intern. Maxilly. is for a short space beyond the condyle of the lower Maxilla, covered by the Ext. Pterygoid, the middle of which it perforates from within outwards, and then inclining forward over or superficially to the muscle, is disposed as usual.
	L			the Ant. Jug. vein is very large, & communicates with the Int. Jugular over the External and Internal Carotid arteries. The Int. Jugular vein covers the Com. Car. for some space.	
249	R	$3\frac{1}{2}$	Th. Cart.		Brs. usual.
	L	$4\frac{3}{4}$	above Th. Cart.		Lingl. and Facl. from a com. trunk. Occipl. is unusually high in its origin. Pharyngl. fr. Intern. Car.
250	R	$3\frac{7}{8}$	middle of Th. Cart.		Brs. of Ext. Car. usual. Intern. Carotid measures $3\frac{1}{4}$ inches.
	L		middle of Th. Cart.		
251	R		usual.	covered at its upper part by the Ant. Jug. vein.	Occipl. arises opposite Thyr. Pharyngl. given by Intern. Car. Intern. Maxillary passes under Ext. Pterygoid muscle and between the Gustatory and Dental brs. of the 5th nerve, which are connected by a transverse Branch below the vessel. At the anterior part of the muscle. the artery is seen to curve forwards and inwards, as usual.
	L		usual.	gives Super. Thyroid and Pharyn.; the latter in the bifurcation.	Sterno-Mast. and Palat. are separate brs. of Ext. Car. Post. Auricr. fr. Occipl. Other Brs. nearly usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
252	R	$2\frac{1}{2}$		middle of Th. Cart.	Ext. Car. $2\frac{3}{4}$ inches long. Pharyngl. is given fr. Occipl., and crosses over the Intern. Car. in its course inwards.
253	R		usual.		
	L		usual.		Thyr. of small size. Other Brs. usual.
254	R	$3\frac{3}{4}$	above Th. Cart.		Lateral nasal br. is given from the Ophthalmic artery. Infer. Palat. arises separately fr. Ext. Car. Intern. Maxillary is at first under Ext. Pterygoid; it perforates the middle of the muscle, and after coursing forward or superficially to it, enters the Spheno-Maxillary fossa in the usual way, while, concealed by the Pterygoid muscle, the artery is external (superficial) to the Infer. Maxillary division of the 5th nerve, and is crossed by a Branch which communicates between the Temporo-Auricr. and the Dental nerves. Other Brs. usual.
	L		usual.	the Super. Thyr.	Lingl. and Pharyngl. joined at their origin. Intern. Maxillary is under Extern. Pterygoid muscle, and runs through the brs. of the Infer. Maxillary division of the 5th nerve. Other Brs. usual.
256	R				Lingl. and Facl. fr. a com. origin. Other Brs. usual.
	L		usual.	a Thyr. br. (the 5th in this case) arises at the junction of L. Car. and Innom.	Lingl. and Facl. by a com. origin. Other Brs. usual.
257	R		usual.		Intern. Maxillary lies under cover of the Extern. Pterygoid muscle; it curves in a small space outwards, and then forwards and inwards to the Spheno-Maxillary fossa, more distinctly than usual.
	L		usual.		Intern. Maxillary on this side is External or superficial to the Extern. Pterygoid muscle. Pharyngl. arises fr. Occipl.

COMMON CAROTID					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
258	R		Th. Cart.	gives Super. Thyr. at the point of bifurcation.	Ext. Car. gives a br., which ramifies in the Stylo-Glossus and Stylo-Pharyngeus muscles. Thyr. small. Other Brs. usual.
	L		usual.		Thyr. small. Lingl. and Facl. by a com. origin.
259	R		usual.		
260	R		usual.		Thyr. a small br. Lingl. and Facl. by a com. origin. Other Brs. usual.
	L			the Super. Thyr.	Palat. given separately fr. Ext. Car. Intern. Maxillary under the Ext. Pterygoid muscle which it perforates exactly at the middle, and then, after coursing forwards and inwards over the muscle, is disposed in the usual way. Other Brs. usual.
261	R		usual.		Thyr. a large br. Other Brs. usual.
	L		above Th. Cart.	the Super. Thyr.	Brs. usual.
262	R		Os H.	gives Super. Thyr. and one of two Pharyngl. brs.	2 Pharyngl. brs. in this case. The smaller is given in the bifurcation of Com. Car. The larger arises fr. Ext. Car. 1 inch above the Com. Car.
264	R		Os H.	gives Super. Thyr. at point of bifurcation.	Lingl. and Facl. fr. a com. origin. Pharyngl. fr. Occipl., which arises below preceding br. Other Brs. usual.
265	L	$4\frac{1}{4}$		fr. Innom.	Thyr. small. Lingl. and Facl. by a com. origin; fr. Facl. are given two brs., one very small, after passing betw. the Stylo-Gloss. and Stylo-Pharyngl. is soon lost in the muscles; the second larger, runs anteriorly to the first named muscle and ramifies in the Intern. Pterygoid. Other Brs. usual.
269	R		usual.		Lingl. gives the Submental, which pierces the Mylo-Hyoid muscle fr. within outwards. Pharyngl. arises fr. Occipl., and is large at the same time that the Infer. Palat. is a small br. Other Brs. usual.
270	R				Thyr. larger than usual. Other Brs. usual.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
	L				Thyr. large and gives a considerable br., which crosses to the opposite side over the Crico-Thyroid membrane. Other Brs. nearly as usual.
271	R			the Super. Thyr.	The Brs., except Post. Auricr. and the terminal, arise close to the beginning of Ext. Car. Lingl. and Facl. given fr. a com. origin. Other. Brs. usual.
	L		Os II.	the Super. Thyr.	Several Brs. arise from the beginning of the Ext. Car. The Soft Palate is supplied fr. the Pharyngl. Facl. gives brs. to Intern. Pterygoid muscle in the place of Palat. Submaxillary gland receives a br. fr. the Lingl. as well as brs. from the Facl. Other Brs. usual.
272	R				Palat. br. of Facl. ends on the Tonsil. Pharyngl. larger, and supplies the Soft Palate. Intern. Maxillary under Extern. Pterygoid muscle. Other Brs. usual.
273	R		usual.		Laryngl. and Palat. are separate brs. of Ext. Car. Pharyngl. arises fr. Occipl.; does not supply the Soft Palate.
	L			the Super. Thyr.	Laryngl. and Palat. each separately fr. Ext. Car. Pharyngl. fr. Occipl. Intern Maxillary under the Extern. Pterygoid muscle.
274	R		usual.		Lingl. and Facl. fr. a com. origin. Intern. Maxillary under Extern. Pterygoid muscle. Other Brs. usual.
275	R			gives Super. Thyroid and Laryngl. separately.	Palat. a separate br. of Ext. Car. Other Brs. nearly usual.
	L				Palat. a separate br. of Ext. Car. Tonsil receives a distinct Br. fr. Facl. Other Brs. nearly usual.
276	L				Lingl. and Facl. by a com. origin. A distinct Br. is given to the Tonsil. Intern. Maxillary under Extern. Pterygoid muscle.
277	R				The Facl. arises above the Digastric muscle.

COMMON CAROTID.					EXTERNAL CAROTID—BRANCHES.
No.	Side of the Body.	Length in Inches.	Place of Division.	Peculiarities.	
278	R		usual.		Lingl. and Facl. by a com. origin; the latter gives besides the Palat. a distinct br. to the Tonsil. Pharyngl. arises fr. the origin of the Linguo-Facl. trunk, and does not send any br. to the Soft Palate. Other Brs. usual.
281	R				Facl. gives Palat. and Tonsil. brs., which supply respectively the Soft Palate and the Tonsil. Pharyngl. does not supply the Palate.
290	L		usual.		Left Palat. (fr. Facl.) supplies the Soft Palate. Other Brs. usual.
291	R		usual.		Thyr. sends a large br. over the Crico-Thyr. membrane to the opposite side. Other Brs. usual.

COMMON CAROTID ARTERIES.

ABSTRACT OF THE TABLE.

	NUMBER
Right side.	
less than 3 inches	2
3 inches, not exceeding $3\frac{1}{2}$	21
more than $3\frac{1}{2}$, not exceeding 4	24
more than 4, not exceeding $4\frac{1}{2}$	15
more than $4\frac{1}{2}$, not exceeding 5	5
more than 5, not exceeding $5\frac{1}{2}$	1
Left side.	
less than 4 inches	0
4 inches, not exceeding $4\frac{1}{2}$	11
more than $4\frac{1}{2}$, not exceeding 5	18
more than 5, not exceeding $5\frac{1}{2}$	9
more than $5\frac{1}{2}$, not exceeding 6	9
more than 6, not exceeding $6\frac{1}{2}$	2

PLACE OF DIVISION.

Opposite the Cricoid Cartilage R.	2	
L.	3	
		5
Below upper margin of the Thyroid Cartilage R.	17	
L.	9	
		26
Opposite upper margin of the Thy. Cartilage R.	105	
L.	79	
		184
Above Thyr. Cartilage R.	15	
L.	8	
		23
Opposite Os Hyoides R.	29	
L.	18	
		47
Above Os Hyoides R.	3	
L.	7	
		10

EXTERNAL CAROTID ARTERIES—BRANCHES.

The facts contained in the part of the table which refers to the External Carotid Arteries and their Branches, will be made use of in the observations on those vessels.

EXPLANATION OF PLATE VIII.

This plate shows the arteries at the upper part of the neck, and the side of the face and head.

a The tendinous fibres in which the occipital part of the occipito-frontal muscle ends; in front this tendon is continued by a membranous structure to the fibres of the frontal part of the same muscle, and at the side it receives the attachment of the upper muscle of the pinna of the ear.
b Frontal part of the occipito-frontal muscle.
c The superior muscle of the ear; below it are a few muscular fibres —the anterior muscle of the same part; and both are connected by a membranous, or, as it appeared, a musculo-membranous structure, to the outer margin of the muscle marked *b*.
d Orbicularis palpebrarum; from it a few pale fibres descend to the lip in connexion with its Levator.
e Levator Labii superioris.
f Levator anguli oris.
g Zygomaticus.
h Orbicularis oris.
i Depressor labii inferioris.
k Depressor anguli oris.
l A portion of the Platysma myoides.
m Buccinator.
n Masseter.
o A little of the parotid gland and the duct.
p Digastric.
q Stylo-hyoid.
r Mylo-hyoid.
s Hyo-glossus.
t Os Hyoides.
u Thyroid cartilage.
v Sterno-hyoid.
w Omo-hyoid.
x Sterno-thyroid.
x[1] Thyro-hyoid.
y Sterno-cleido-mastoid.
z Thyroid body.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid. From this artery a branch is given backwards to the sterno-mastoid, and the lymphatic glands beneath it; another, the laryngeal, is directed under the thyro-hyoid; the hyoid branch ramifies over the os hyoides, supplying the muscles attached to that bone and the integuments over them. The rest of the artery is distributed to the muscles and the thyroid body.
5. Lingual. It usually curves upwards and inwards as seen here, before entering under cover of the hyoglossus and mylo-hyoid muscle, and sometimes gives a hyoid branch to the muscles in the neighbourhood.
6. Facial exposed beneath the maxilla by the removal of the submaxillary gland.
7. A sterno-mastoid branch given frequently as here from the external carotid.
8. Occipital.
9. Posterior auricular.
10. Beginning of internal maxillary.
11. Temporal giving forward a small branch, superior masseteric, to the masseter muscle; and back-

wards another, the anterior auricular.
12. Transverse facial, usually derived from the temporal.
12¹. Middle temporal.
13. Submental.
14. Inferior labial.
15. Inferior coronary.
16. Superior coronary.
17. Lateral nasal.
18. A branch of the ophthalmic artery escaping from the inner side of the orbit, and freely communicating with the end of the facial artery.
19. A branch of the same artery—frontal—which also ascends from the orbit over the frontalis muscle, and anastomoses with the anterior temporal.
20. Anterior temporal, from which some branches extend forward towards the orhit, and others at small intervals are directed in a peculiar manner backwards, and to the opposite side.

VEINS.

22. Internal jugular.
23. Facial.

EXPLANATION OF PLATE IX.

This plate is intended to show the internal maxillary artery. The masseter muscle was removed, except a small part of its lower end. The zygoma is seen to have been divided and a portion taken away; the condyle, neck, and part of the ramus of the lower maxilla remain in their natural position; the coronoid process and a considerable portion of the ramus are turned up on the temple with the temporal muscle.

a Temporal muscle.
b External pterygoid.
c Internal pterygoid.
d Buccinator, into which the duct of the parotid gland enters.
e A small part of the masseter.
f Digastric.
g Sterno-cleido mastoid.
h Zygoma.
i Lower maxillary bone.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Occipital.
5. Posterior auricular.
6. Temporal.
7. Internal maxillary.
8. Inferior dental.
9. Middle meningeal sinking beneath the external pterygoid muscle.
10. Deep temporal—anterior branch.
10¹. Deep temporal — posterior branch *.
11. Buccal.
12. Superior maxillary—alveolar or dental branch.

* In the third figure of his seventh plate, Tiedemann places the deep temporal arteries over or superficially to the temporal muscle.

NERVES.

The nerves here seen are all branches of the third or inferior maxillary division of the fifth nerve.

13. Inferior dental.
14. Lingual or gustatory.
15. Masseteric.
16. Buccal.

The temporal nerve is directed upwards near the posterior deep temporal artery, and there exists in this case another branch situated farther forward, and furnished by the buccal nerve. The second temporal nerve, though not constant, is not unfrequently met with.

EXPLANATION OF PLATE X.

VIEW OF PHARYNGEAL AND LINGUAL ARTERIES.

The lower maxillary bone was divided near its middle, and its left side removed as well as the muscles connected to it, with the exception of those attached to the bone near its symphysis. The temporal muscle was divided above the zygoma, and cleared from under it in order to show the process more fully. The buccinator muscle was cut away, and with the intention of displaying the pharynx more clearly, it was distended and the os hyoides hooked forward.

a External pterygoid process of the sphenoid bone.
b Tensor v. circumflexus palati muscle.
c Levator palati.
d Superior constrictor of the pharynx.
*d*¹ Tonsil.
e Middle constrictor of the pharynx.
f Inferior constrictor.
g Hyoglossus.
h Genio-hyoglossus.
*h*¹ Sublingual gland; on which lies a part of the duct of the submaxillary gland.
i Genio-hyoid.
k Mylo-hyoid, turned down after separation from the lower maxilla.
l Digastric.—The attachment to the maxillary bone is left, the greater part of the muscle is turned to the back part of the neck.
m Styloid process of the temporal bone.
n Stylo-glossus muscle.
o Stylo-pharyngeus.
p Os hyoides.
q Thyroid cartilage.
r Sterno-hyoid muscle.
s Omo-hyoid.
t Sterno-thyroid.
*t*¹ Thyro-hyoid.
v Sterno-cleido-mastoid.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid, giving among others the
4[1]. Laryngeal.
5. Lingual.—The peculiar curve of this artery is removed by the traction on the os hyoides, and the distension of the pharynx. It is seen to give, behind the hyoglossus muscle, a small artery directed downwards to the muscles connected to the hyoid bone (hyoid branch) and upwards another (arter. dorsalis linguæ). Anteriorly to the hyoglossus muscle, the sublingual branch is seen to ramify on the gland; the Ranine artery is directed onwards to the end of the tongue, decreasing in size; and, in this case, several of the muscular branches emanate from a common trunk, which is seen below the artery last named.
6. Facial.—Its palatine branch was, in the body from which the drawing was taken, very small, and ended in the tonsil.
7. Pharyngeal.—Here of large size, and its upper part giving a considerable branch, which arches downwards and is directed to the soft palate over the margin of the superior constrictor of the pharynx, and in company with the tensor and the levator palati.
8. Occipital.
9. The end of the internal maxillary in the spheno-palatine fossa.
10. The middle meningeal branch of the preceding; from it is given forwards a small artery, which ramifies over the large plexus of veins found in this situation, after having furnished a meningeal branch through the foramen ovale of the sphenoid bone (art. meningia parva); this is seen beside the inferior maxillary nerve.
11. Temporal.

NERVES.

12. Inferior maxillary division of the fifth.
12[1]. Lingual or gustatory branch of preceding.
13. Hypoglossal, or 9th; the two last have a branch of communication extending between them.
14. Pneumogastric or N. vagus.
14[1]. Its superior laryngeal branch.
15. Glosso-pharyngeal.

EXPLANATION OF PLATE XI.

The integuments, platysma myoides, and cervical fascia, were removed from the upper part of the neck of the body of which this drawing is a representation. The parotid gland was also taken from the fossa behind the branch of the lower maxillary bone and the greater part cut away.

a Masseter muscle.
b Digastric.
c Duct of parotid gland.
c[1] Suh-maxillary gland.
d Thyroid cartilage.
e Sterno-hyoid muscle.
f Omo-hyoid.
g Sterno-thyroid.
g[1] Thyro-hyoid.
h Sterno-clcido-mastoid.
h[1] Part of the same muscle turned hack.
* * Lymphatic glands.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid. This vessel gives the following offsets: viz. a laryngeal branch which is seen to sink under the thyro-hyoid muscle (*g*[1]); a small hyoid (?) branch over that muscle; an artery which, after crossing over the large vessels, is distrihuted to the lymphatic glands and the sterno-mastoid muscle. The remaining division of the thyroid artery ramifies in the thyroid hody and the muscles which cover it.
5. Lingual. The hyoid branch of this artery is here very distinct.
6. Facial: as it emerges from the suh-maxillary gland, this artery sends off the inferior masseteric branch which is directed upwards on the muscle, and farther forward the submental artery which supplies the lymphatic glands and the contiguous muscles.
7. Temporal; from which near its origin are derived two branches, viz. superior masseteric and transverse facial.
8. Internal maxillary.

VEINS.

9. Temporo-maxillary vein, resulting from the union of the temporal and the internal maxillary, and ending as external jugular.
10. Internal jugular. It receives on its inner side two, which may he called thyroid veins, and ahove these the facial (12).
11. External jugular, descending over the sterno-mastoid muscle to terminate in the subclavian vein. There is a branch of communication hetween the external and the internal jugular veins opposite the angle of the maxilla. The branch in this case joins the facial as that vein is about to enter in the internal jugular.
12. Facial. This vein receives the suhmental from helow the base of the maxillary hone; and where it crosses the external carotid artery another vein is seen to enter it from ahove. The vessel last referred to results from the junction of two small veins (one of them is observahle in the drawing ahove the digastric muscle, the other lay concealed hy the artery) which accompany the carotid in the manner of venæ comites.

NERVES.

13. Pneumogastric or n. vagus.
14. Portio dura of seventh; the branches have been cut and removed.
15. Descending branch of the ninth (n. descendens noni), forming with a branch derived from the cervical nerves, a loop from which filaments are given to the muscles,
16. Auricular, from the cervical plexus, seen to communicate with the portio dura.
17. Spinal accessory.

EXPLANATION OF PLATE XII.

a Thyroid cartilage.
b Trachea.
d Thyroid body.
e Masseter muscle.
f Digastric.
g Œsophagus.

ARTERIES.

1. Aorta—its ascending part.
2. Aorta—its descending part.
3. Innominate.
4. Right common carotid.
4¹. Left common carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Right external carotid.
6¹. Left external carotid.
7. Right internal carotid.
7¹. Left internal carotid.
8. Superior thyroid.
8¹. Laryngeal.
9. Lingual.
10. Facial.
10¹. Ascending palatine.
11. Occipital.
11¹. Pharyngeal.
12. Posterior auricular.
13. Thyroid axis.
13¹. Inferior thyroid.

NERVES.

14. Pneumogastric or n. vagus.
14¹. Inferior laryngeal.

The plate is intended to show some of the variations of the common carotid and the external carotid arteries. Those which occur in the origin of the former, are illustrated in the plates in which the arch of the aorta and its branches are represented.

In Figure 1, the common carotid of the right side is seen to extend much higher than usual—considerably above the hyoid bone.

In Figure 2, the external and internal carotid arteries are seen to separate from the common carotid, opposite the cricoid cartilage.

The common carotid is altogether wanting on the right side in figure 3; and the external and internal carotid are seen to take origin directly from the aorta.

Figure 4.—The common carotid gives the superior and the inferior thyroid arteries. The branch directed inwards under the carotid from the thyroid axis was distributed to the œsophagus and the trachea. In the preparation from which the sketch has been taken*, both carotid arteries are derived from the aorta by a short common trunk, and the right subclavian, taking its rise to the left of the other branches crosses to the first rib immediately in front of the vertebral column. The inferior laryngeal nerve, instead of turning upwards behind the subclavian artery, branches from the pneumogastric opposite the lower end of the larynx. These facts will be further noticed under the head of the subclavian artery.

In Figure 5, the external carotid of the right side is placed between the digastric and the stylo-hyoid muscles, instead of being covered by both.

Figures 6, 7, and 8, are intended to illustrate peculiarities often noticed in the place of origin of the branches of the external carotid. In the first of the sketches, the branches are seen to be given off only at the lower and the upper ends of the main vessel; in the second, they arise close together below its middle; and in the third case they are given in succession at nearly regular intervals.

Figure 9.—The superior thyroid artery is derived from the common carotid at a considerable distance from its division, and the laryngeal is a distinct branch of the carotid.

* No. 239, in my collection.

EXPLANATION OF PLATE XIII.

a Temporal muscle.
b External pterygoid.
c Internal pterygoid.
d Styloid process of the temporal bone.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid.
4¹. Laryngeal.
5. Lingual.
6. Facial.
7. Occipital.
8. Temporal.
9. Internal maxillary.
9¹. Middle meningeal (fig. 7).
10. Posterior auricular.
11. Pharyngeal.
12. Middle meningeal (fig. 8).
13. A branch of the internal maxillary which enters the skull through the foramen ovale, and joins that marked 15.
14. Infra-orbital.
15. A branch of the internal maxillary, entering the cranium through the foramen rotundum, and joining the vessel marked 13, to form a considerable trunk, which gives the ophthalmic and a cerebral artery.
16. Ophthalmic.
17. Inferior dental.

18. Optic nerve.

Figure 1 shows the superior thyroid and lingual arteries united at their origin; and there are two pharyngeal branches.

In Figure 2, the superior thyroid is joined to the common trunk of the lingual and facial.

In Figure 3, two superior thyroid arteries and the laryngeal are seen to arise separately from the external carotid; the occipital and pharyngeal branches take origin above their most frequent position.

The lingual and facial arise by a common trunk in figure 4.

The facial (in figure 5) is given off considerably higher than usual, and descends behind the angle of the lower maxilla to gain its ordinary situation.

Figure 6.—The facial and internal maxillary arise by one trunk in the usual position of the former, so that it may be said the internal maxillary is derived from the facial.

In Figure 7, the internal maxillary is covered by the external pterygoid muscle.

Figure 8.—In the preparation here represented*, the internal carotid artery and the carotid canal of the temporal bone are absent. The place of the carotid artery is supplied by two branches of the internal maxillary which enter the cavity of the cranium through the foramen rotundum and the foramen ovale. The vessel constructed by the junction of the two branches indicated, are seen in the preparation to lie to the inner side of the nervus trigeminus; and it may be added, that the unusual arteries are more tortuous than they are represented in the drawing. The internal carotid artery of the right side is larger than usual, and doubtless compensated for the small size of the cerebral artery shown on the left side.

EXPLANATION OF PLATE XIV.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid.
5. Lingual.
6. Facial.
7. Occipital.
7¹. A large branch of the occipital taking an unusual course over the sterno-mastoid muscle.
8. Temporal.
8¹. A large branch of the preceding directed over the orbit.
9. Internal maxillary.
10. Transverse facial.
11. A large branch of the internal maxillary.
12. Infra-orbital branch of the internal maxillary.
13. Supra-orbital branch of the ophthalmic, giving upwards a considerable frontal artery, and downwards another branch which ramifies on the nose.
14. Pharyngeal.
15. External jugular vein.
16. Pneumogastric nerve or n. vagus.

This plate illustrates some of the variations of the facial, the temporal, and the occipital arteries.

The facial artery is shown in figure 1 to end in the inferior masseteric and the submental branches. Its place is taken on the face by branches of the internal maxillary (11 and 12), and by the inferior coronary of the left side.

Figure 2 shows the deficiency of the facial supplied by the transverse facial (10).

In Figure 3, the transverse facial artery (10) and a branch of the ophthalmic are seen to compensate for the small size of the facial.

* No. 357.

Figure 4 is a representation of a large branch of the temporal artery directed along the upper margin of the orbit, where it joins with a small branch of the ophthalmic, and furnishes the frontal arteries.

Figure 5. The greater part of the occipital artery is seen in this figure to be directed to the occiput over all the muscles, while but a small branch follows the usual course of that vessel.

The occipital is shown in figure 6 taking origin from the internal carotid artery.

EXPLANATION OF PLATE XV.

a Temporal muscle.
b Pterygoid process of the sphenoid bone.
c Circumflexus, or tensor palati muscle.
d Levator palati.
e Superior constrictor of the pharynx.
f Middle constrictor.
g Hyo-glossus.
h Genio-hyoglossus.
i Genio-hyoid.
k Mylo-hyoid.
l Sublingual gland.
m Hyoid bone.
n Thyroid cartilage.
o Styloid process of the temporal bone.
p Stylo-glossus muscle.
q Stylo-pharyngeus.
r Stylo-hyoid.
s Digastric.
t Sterno-cleido-mastoid.
v Transverse process of the atlas.
w Duct of parotid gland.
x M. rectus anticus capitis major.
y Submaxillary gland.

ARTERIES.

1. Common carotid.
2. External carotid.
3. Internal carotid.
4. Superior thyroid.
5. Lingual.
6. Facial.
6¹. Inferior palatine.
7. Occipital.
8. Temporal.
9. Internal maxillary.
9¹. Middle meningeal.
* Small meningeal.
10. Posterior auricular.
11. Pharyngeal.
12. Vertebral.

13. Inferior maxillary division of the fifth nerve.

The fifteenth plate is intended chiefly to show some of various conditions of the pharyngeal artery.

Figure 1. The arrangement of the pharyngeal and the inferior palatine arteries in this figure contrasts with that represented in the ninth plate. Here the pharyngeal ends in three branches, one of which continues close by the internal carotid artery and enters the cranium; the two others arch

down to the pharynx on which they are distributed. The inferior palatine, after furnishing many branches to the pharynx, in front of the pharyngeal, and to the tonsil, arches over the superior constrictor to the soft palate, in which it ramifies.

The lingual artery (5) in this plate preserves its usual curve towards the hyoid bone. The sublingual branch is small, but on the lower part of the gland is seen part of another artery, which was probably derived from the facial, and penetrated the mylo-hyoid muscle. The peculiar mode of ramification of the artery, and its gradual decrease in size, are well shown in front of the hyoglossus muscle.

The internal maxillary artery (9) in this case was covered by the external pterygoid muscle as in plate 13, figure 7, and in consequence of the removal of the muscle, that part of the internal maxillary which had been covered by it, and the branches given from the artery in this situation, are exposed.

In Figure 2, the pharyngeal is represented arising from the occipital artery.

Figure 3, shows it taking origin from the internal carotid artery.

Figure 4.—The occipital artery springs from the internal carotid and gives the pharyngeal.

THE COMMON CAROTID ARTERIES.

Inasmuch as the arteries of both sides differ one from the other in their origin and length, they will be treated of separately in reference to these points.

The origin of the right common carotid was found to be in common with that of the subclavian, from the innominate, in all the cases observed (930) with the exception of five*. In two of these it was given separately from the arch of the aorta†; and in the others it was conjoined with the left carotid, both vessels arising from a short common trunk‡. When not united with the subclavian, the vessel under con-

* See abstract of the table, ante p. 32.

† Plate 7, figure 2. The other case differed from that represented in plate 6, figure 13, only in the right vertebral having its usual origin.

‡ Plate 7, figures 4.—See also same plate, fig. 5.

sideration is usually the first branch of the aortic arch*; it is however occasionally preceded by the right subclavian†, and very rarely by the left carotid‡.

The usual situation of the commencement of the right carotid artery, when derived from the innominate, is behind the inner end of the clavicle, or on a level with the upper margin of that bone or nearly so; but the origin is not unfrequently found to be higher or lower than the point indicated. The place of division of the innominate, which obviously is coincident with the beginning of the carotid, was noted in 137 bodies; in 7 of these the carotid separated from the innominate in the neck considerably above the clavicle; in 9 it arose below that bone; and in 121 the origin of the artery occupied the usual situation. The deviations, therefore, in this respect were about 1 in $8\frac{1}{2}$, and they were more frequently above than below the ordinary position.

The length of the common carotid of the right side was noted in 68 bodies. For the details of these cases, reference may be made to the table, ante p. 55 et seq., or to the abstract p. 86. From the latter it appears that in 60 cases the length varied between 3 and $4\frac{1}{2}$ inches; 2 measured less than 3 inches; and the remaining 6 varied between $4\frac{1}{2}$ and 5 inches. The average length may be stated to be from $3\frac{1}{2}$ to 4 inches.

The origin of the left common carotid deviates from the usual position much more frequently than that of the artery of the right side. In 25 out of 219 instances in which the examination was made, the left carotid was derived from the innominate, or was joined with that vessel so as to form with it one large trunk§. The proportion, therefore, of variations from the usual origin, dependent on this source, was nearly 1 in $8\frac{4}{5}$. It is to be observed, however, that the left carotid not only takes its origin in common with both the vessels of the opposite side, but that in the greater number of cases in which the right subclavian is a distinct branch of the aorta it arises in

* Plate 5, fig. 8; plate 6, figs. 11, 12, and 13; plate 7, figs. 5, 6, and 11.

† Plate 6, fig. 10; plate 7, figs. 4 and 13; and to these may be added the remarkable cases represented in plate 5, fig. 9, and plate 12, fig. 3.

‡ Ante p. 48, and plate 7, fig. 2; and a nearly similar case described and delineated by Walter in Nouv. Mém. de l'Acad. des Sciences, &c. Berlin, 1785.

§ Ante p. 45, and plate 6, fig. 7.

conjunction with the carotid of the right side (Pl. 7, figs. 4 and 5). In the foregoing the artery is seen tending towards the vessels of the right side; and in two cases its origin was placed even to the right of both of them *. It is remarkable that the instances which are recorded of a junction between this vessel and the subclavian at its own side are very few. Only three cases are referred to in which the carotid and subclavian arteries were derived from a common or innominate trunk on the left as well as on the right side †; and one is recorded in which the only innominate existed on the left side ‡.

The foregoing remarks on the origin of the common carotid arteries apply to those vessels when the arch of the aorta has the usual course to the left side; when the great artery arches to the right side the branches must be considered as reversed ||.

Place of division of the common carotid arteries. Under this head the vessels of both sides will be treated of together. The bifurcation of the arteries was noted in 295 cases; in 184 it was situated opposite the upper margin of the thyroid cartilage—which is therefore considered the usual position—and in the remaining 111 cases the division occurred at different and more or less distant points. The deviations from the usual place of division, were consequently as 1 in about $2\frac{1}{2}$.

The cases of deviation, 111 in number, were distributed as follows:—

A Those in which the bifurcation occurred above the usual position.

Above the thyroid cartilage, or opposite the hyoid bone	60	about 1 in	5
Above the hyoid bone, considerably higher than usual	10	1 in	$29\frac{1}{2}$
Total above the ordinary place of division . .	70	about 1 in	$4\frac{1}{4}$

* Ante p. 48, and plate 7, fig. 2; and a nearly similar case described and delineated by Walter in Nouv. Mém. de l'Acad. des Sciences, &c. Berlin, 1785.

† Ante p. 46, and plate 6, fig. 9.

‡ Plate 7, fig. 6.

|| Plate 5, figs. 3, 4, and 5; and plate 7, fig. 3.

B Cases in which the division was situated below the usual position.

Beneath the upper margin or opposite the middle of the thyroid cartilage	26	about 1 in	11⅓
Opposite the cricoid cartilage	5	1 in	59
Total below the usual place of division . .	31	about 1 in	9½

No example has occurred in my experience of a higher division of the common carotid than that delineated in the first figure of the twelfth plate, in which the thyroid, lingual and facial arteries are seen to descend from the external carotid to their destinations, instead of being directed immediately inwards, as is usual when the common carotid divides opposite the thyroid cartilage. Allan Burns describes an instance in which the common carotid appears to have extended still nearer to the base of the skull, but several of the branches ordinarily furnished by the external carotid, were given by the common carotid in its ascent*.

The case last referred to, may be regarded in some degree as a transition to the entire absence of a division of the common carotid into two large vessels—the internal carotid being altogether wanting. The carotid artery is seen in one preparation in my possession (see plate 13, fig. 8), to furnish, as it ascends along the neck, the usual branches of the external carotid, and to divide into the temporal and internal maxillary arteries. In the place of an internal carotid, of which there is no trace, two tortuous branches derived from the internal maxillary join within the skull and form a single vessel; this had been distributed to the brain and orbit. The artery so constructed being however smaller than the usual size of the internal carotid, the deficiency is compensated for by the artery of the opposite side, which is of large size. A case is described by Tode†, in which the right internal carotid was absent, and the carotid canal was very small—sufficient only to allow the passage of a bristle.

* "In a preparation which was in my possession, the common carotid, instead of dividing in the neck, sends off lateral branches, till it reaches considerably beyond the angle of the jaw. Opposite to the root of the styloid process it divided into two branches, one formed the internal carotid, the other was the conjoined trunk of the temporal and internal maxillary arteries."—Loco citato, p. 125.

† Medicinisch-chirurgische Bibliothek, B. 10. S. 408, Kopenhagen, 1787.

Instances are on record in which the carotid divided lower down than any referred to above. An example is described by Morgagni, in which the left common carotid was but one inch and a half in length*. It may be inferred that the external and internal carotids must in this case have been given off at the bottom of the neck; and most probably the common trunk would not have been accessible above the clavicle. Reference is made by Allan Burns to an instance of division of the artery opposite the sixth cervical vertebra; but the length of the vessel, or the side of the body on which it occurred, is not stated†.

Absence of the common carotid. The early division of this artery conducts to that condition in which the external and internal carotids, instead of being derived from a common trunk, arise separately from the aorta. This variety was observed by Dr. Power, of Dublin, who states that, "on examining the subject" (one brought for anatomical purposes into the dissecting-room), "I found that the arch of the aorta had ascended unusually high towards the summit of the thorax; there was no arteria innominata, but in the situation usually occupied by this vessel the two vessels we have here delineated arose: the cerebral carotid lying internally but closely related to the external carotid artery, to the outer side of which next arose the right subclavian.‡" See the sketch, plate 12, figure 3.

* "Nam præter corouariam illam de qua dictum est, cum arterias carotides inter se compararem, evidenter major latitudo occurrebat sinistræ, quam dextræ. Cumque illa, vix sesquipollicis ab origine spatio emenso, in duos, insolito exemplo, dividiretur ramos," &c. The observation was made in the body of an aged female, "Paupercula, rusticana fœmina, annorum ut videbatur circiter quinquaginta," &c.—De Sedibus et Causis Morb. per Anatomen indagatis. Epist. 29, art. 20.

† "In one of our subjects the common carotid separated into two trunks low in the neck. The division took place opposite the upper margin of the sixth cervical vertebra and about three inches below the angle of the jaw. The two vessels mounted along the side of the larynx parallel to each other, and enveloped in the same sheath with the internal jugular vein and nervus vagus."

Observations on the surgical anatomy of the head and neck, p. 124, 2nd Edit. by G. S. Pattison, Glasgow, 1824; also in Observations on some of the Diseases of the Heart, &c. by the same author. Edinburgh, 1809, p. 285.

‡ Extract from remarks on the preparation, very obligingly communicated by Dr. Power, lecturer on Anatomy and Physiology in the school of Medicine, Richmond Hospital, Dublin. The drawing was taken by Mr. Kirwan, from the preparation in the Museum of the hospital, and has been furnished to me through the good offices of Professor Hart. The preparation had been inadvertently removed from the body without Dr. Power's knowledge, and the connexion with the aorta severed. The larynx, trachea, and part of the œsophagus, are however preserved in connexion with the two

In Malacarne's case, which has been previously referred to for a remarkable peculiarity of the aorta*, the external and internal carotid arteries of both sides took origin separately from the divisions of the double aorta, and are described as ascending parallel one to the other close to the trachea to the level of the cricoid cartilage. In this situation the external carotid inclined forward, and curving over the internal carotid approached the larynx†. It is to be inferred that the internal carotid lay next the trachea in this as in the case just referred to. Both cases appear to correspond also in the inclination of the external carotid inwards over the other vessel. They differ in the disposition of the aorta, and in the circumstance that in the one case the unusual state of the vessels existed at both sides; while in the other it is seen only on the right side.

Tortuous state of the Arteries.—The carotid like some other arteries, instead of having the usual straight direction, are occasionally found to be much curved; and my observation inclines me to state that, of the carotid arteries, the internal is the most frequently affected in this way. The vessels thus changed are usually, if not exclusively, met with in the bodies of persons of advanced age. An example of the condition alluded to, which was observed by Morgagni in the body of an old man, is worthy of particular notice. The common carotids, though quite straight in other parts, were at the middle coiled up in the manner of a spiral shell, and when the vessels were artificially untwisted, they immediately resumed the curved state on the removal of the extending force‡.

unusual vessels. It must be added that in the sketch (plate 12, fig. 3) made from the original drawing, the liberty, I hope not altogether an unwarrantable one, has been taken to represent the larynx with more distinctness than it is seen in the preparation, and to add or restore in outline the aorta and the subclavian arteries. By the difference in drawing it may be at once discerned how much belongs to the preparation.

* Ante p. 22, and pl. 5, figs. 9 and 10.

† After describing the peculiarities of the aorta and the origin of subclavian arteries, the author proceeds :—"I secondi tronchi che formavano le sole carotidi esterne e gli ultimi piu alti e posteriori, che constituivano le sole carotidi interne salivano paralelli ai lati della trachéa prendendosi in mezzo le jugulari interne fino all' altezza della cartilagine cricoidea. Là i tronchi delle carotidi esterne portandosi piu innanzi con le jugulari, s' incrocicchiavano con le carotidi interne per avvicinarsi maggiormente alla laringe," &c. &c.—Osservazioni in chirurgia, p. 2, 119.

‡ Nec singulare quoddam carotidum vitium est reticendum : quæ cum ad suæ longitudinis medium ascendissent, ibi se iutorquebant cochleæ instar, statimque ad rectitudinem redibant; eratque ille flexus adeo pertinax ut si in rectum arterias extenderes, mox amota manu, in eandem se contorsionem restituerent.—De Sedibus et Causis Morbor. &c. Epist. 49, Art. 18.

Veins and Nerves.—The position which the anterior and the internal jugular veins occasionally bear with reference to the carotid arteries, has been mentioned and illustrated in a former part of this work; and a variety in the position of the nervus vagus is shown in the same place *. It will here only be added, that I have frequently seen the internal jugular vein cover the carotid artery: and in two bodies the vein and nerve lay distinctly over it. The unusual situation of the vein occurs much more frequently and to the greatest extent on the left side; this fact may, perhaps, be owing to the inclination the veins have towards the right side of the heart.

Branches are very unfrequently given in the course of the common carotid arteries, except near the bifurcation, where the superior-thyroid is frequently seen to arise. That vessel was derived from the common carotid in 41 of the cases noted in the table, giving a proportion of 1 in 7$\frac{1}{5}$. The laryngeal artery was also a distinct branch of the same trunk in three instances, and in but two of all the cases (930) was the common carotid observed to give an offset in any other situation. In both the instances last referred to, an inferior or an additional thyroid was the unusual branch: one is represented in plate 12, figure 4, in the other the branch was given from the common carotid near its origin. Examples of the thyroid arising from the lower part of the carotid are noticed by several observers; e. g. Nicolai†, Erdmann‡, Haller§, and Huber ‖.

The vertebral artery has been seen to take origin from the common carotid. This rare variety is shown in plate 6, fig. 13, which is taken from a preparation in the Museum of St. Bartholomew's Hospital. Other examples are described by Murray and Green¶. In these cases the variety occurred on the right side of the body, and the right subclavian artery arose from the left side of the aorta.

* Page 14, and plate 4.

† De direct. Vasor. 1725, in Haller Disp. Anatom. Select. vol. ii. p. 499.

‡ Descript. Anatom. Art. innom. et thyroidcæ imæ, p. 31. Jenæ 1772. This Essay contains the observations of Neubauer, whose pupil the author was.

§ Elem. Physiol. vol. iii. p. 404.

‖ Acta. Helvet. t. 8. p. 84.

¶ Der. K. Schwedischen Acad. der Wissenschaften Abhandl.—aus dem Schwedischen übersetzt von A. G. Kästner, b. 30. s. 92.

"All the vessels arise from the left side of the arch. First, the right carotid, which crosses the lower part of the trachea, giving off the right vertebral," &c.—An Account of the Varieties in the Arterial System of the Human Body, p. 7.—Dublin, 1830.

EXTERNAL CAROTID ARTERIES.

But few peculiarities requiring notice occur in the anatomy of the external carotid independently of the branches. In reference to its connexions, it requires only to be stated that the artery is sometimes directed upwards between the stylo-hyoid and digastric (plate 12, fig. 5), instead of being as usual covered by both these muscles.

The Length.—On referring to the table it is found that the length was noted in 61 cases, which may be set down under the three following heads, viz. :—

From $2\frac{1}{4}$ to $2\frac{3}{4}$ inches,—inclusive	44
From 3 to $3\frac{1}{2}$,—inclusive	12
Below those contained in the first division, and not less than 2 inches	5
	61

The branches of the external carotid vary to a great extent in the position at which they are given off, and in their number.

Origin of the branches.—The variations which take place in the origin of the branches will be noticed as each comes under consideration; the observations to be made on the subject in this place will therefore have reference only to peculiarities observed in the position of the branches generally or taken together. In some cases recorded above, the origins of several branches were crowded together at the beginning of the parent vessel (plate 12, fig. 6*); in other cases the arteries were seen to arise close together at some distance higher up (plate 12, fig. 7); lastly, they were sometimes observed, as shown in fig. 8 of the same plate, to take origin at nearly regular intervals.

Number of the branches.—Independently of several small vessels furnished to the parotid gland, &c., the usual number of the branches derived from the external carotid, and to which names are assigned, may be stated to be eight, viz. the superior thyroid, lingual, facial, occipital, posterior auricular, internal maxillary, temporal, and pharyngeal. I am

* "In a preparation of the vessels of the head and neck which is in my possession," says Allan Burns, "the external carotid is a short thick stump, resembling the axis arteriæ cœliacæ, and like it, from the top of this, the large branches take their origin." Observations on the Surg. Anat. of the Head and Neck, p. 125.

under the impression that most frequently there is no separate sterno-mastoid branch. The number stated may be diminished or increased, or by the coincidence of a source of diminution with one of increase, may continue unaltered though the branches of which it is made up are in some respects different.

The following are the sources of decrease of the number of branches :—

Absence of the superior thyroid artery, which is often derived from the common carotid; the union of the same artery with the lingual or with the common trunk of the lingual and facial.

Union of the lingual and facial.

Absence of the occipital; this artery being in some cases given from the internal carotid, and occasionally from the subclavian.

The origin of the posterior auricular from the occipital.

The junction of the internal maxillary to the facial.

The origin of the pharyngeal from the occipital or from the internal carotid ; or its entire absence.

The increase of the number is owing either to the fact that arteries usually given from another source are supplied directly by the external carotid, or to the existence of an additional artery. The branches mentioned in the table as thus changed in their origin, are :—the laryngeal, ascending palatine, and transverse facial. The unusual or additional branches to which an increase of the number is occasionally owing, are :—the sterno-mastoid, a second superior thyroid, a second or even a third pharyngeal.

SUPERIOR THYROID ARTERY.

The condition of the superior thyroid artery was noted in 292 cases ; in the computation the vessels of the right and the left side have been added together.

Independently of variations in size, the examples of which were very numerous, the most remarkable peculiarities met with are as follows :—

In several cases the artery supplied the thyroid body on the opposite side; the branch following this unusual course was observed to be of large size, and to cross the crico-thyroid membrane in	5	
The super. thyroid was derived from the common carotid in	41	1 in 7⅓
The origin was joined to that of the lingual artery in .	2	
to the common trunk of the lingual and facial in	1	
There were two thyroid arteries (the laryngeal being a separate branch in 2 of these) in	3	
The hyoid branch is often very small, or even wanted altogether.		
The laryngeal artery arose separately from the external carotid in	24	
from the common carotid in	2	
	26	about 1 in 11¼

Some other peculiarities of the last named branch will be noticed when the superior and inferior thyroid arteries are under consideration.

The thyroid did not supply the thyroid body; the small artery occupying its situation, ended in branches to the sterno-mastoid muscle and the larynx, in . . .	3	

LINGUAL ARTERY.

Origin.—The lingual artery frequently takes rise not singly or directly from the external carotid, but through the medium of a trunk common to it and the facial. This mode of origin was found in 61 of 302 cases noted in the table—or about 1 in 5. In two cases it was joined with the thyroid, pl. 13, fig. 1.

Branches.—The hyoid branch is not unfrequently deficient; and it appears to me that in general when a hyoid artery of good size is given from the lingual, the thyroid supplies none, or a very small one, and the converse. See plates 3, 8, 10 and 11, in which different conditions of the hyoid branches are illustrated.

The sublingual, ordinarily a branch of the lingual artery, is occasionally derived from the facial. When it has this unusual origin, its course to the gland is either through the mylo-hyoid muscle, or with the duct of the submaxillary gland behind and beneath the muscle. The sublingual gland was seen in one case to be furnished from both the lingual and the facial arteries. The lingual artery has been observed to furnish the submental artery and the ascending palatine.

FACIAL OR LABIAL ARTERY*.

The most frequent change in the origin of the artery is its junction with the lingual (see the observations on the origin of that artery and of the superior thyroid). Occasionally it takes its rise above the usual position, even as high as the middle of the ramus of the lower maxilla, and thence descends beneath the angle of this bone to assume the usual course (pl. 13, fig. 5).

In size this artery is very variable—also in the extent to which it reaches. In the case delineated in plate 14, fig. 1, the vessel is expended almost altogether beneath the maxilla, ending as the submental; figs. 2 and 3 show it reaching to the lower lip and the side of the mouth. The sketches just referred to serve to illustrate the various means by which the deficiency alluded to is supplied. The vessels which take the place of the facial when deficient are derived either from the ophthalmic, the transverse facial, or the internal maxillary; the first mentioned is that most frequently thus supplemental, and it generally descends to the nose from the inner side of the orbit, and not, as represented in the third figure of the plate, in common with the frontal artery.

Branches.—Ascending palatine artery†. This vessel was found, instead of being a branch of the facial, to be derived from the external carotid in 21 of the cases detailed in the table,—or about 1 in 14. Its size varies considerably —the variations in this respect being dependent on the extent to which it reaches and the parts which it supplies; thus, in some cases it supplies the soft palate, in others, on the contrary, it is expended on the pharynx and tonsil, and in one case a considerable branch was given to the tongue. It may be asked, why is the artery named palatine when it does not extend beyond the tonsil? We can only say, that the shorter

* Labialem arteriam voco, quam vulgo vel maxillarem externam vocant, vel maxillarem, vel denique ob supremos ramos, angularem. Maxillaris enim nomen mihi ambiguum videtur, angularis plerumque non verum; labia vero vix unquam non adit. —Haller. Icon. Anatom. Fascic. 3, n. 10.

† Palatinam adscendentem vocavi, vix descriptam hactenus, ut a palatina descendente separarem, quæ ramus est maxillaris internæ.—Icon. Anatom. fascic. 3, n. 11.

vessel occupies the position between the muscles of the styloid process, and has the direction which belongs to the artery when it reaches the palate.

A special tonsillar branch of the facial is often found, but is still more frequently absent. Further observations on the palatine and tonsillar branches are placed under the head of the pharyngeal artery. A branch of the facial is occasionally given to the sublingual gland, and this unusual vessel either follows the duct of the submaxillary gland inwards, or perforates the mylo-hyoid muscle—this variety was noted in five cases. On the other hand, the lingual occasionally sends branches to some of the parts, which ordinarily derive their supply from the facial. Thus the submental was seen in one case to be derived from the lingual; a supplemental palatine artery and a branch to the submaxillary gland were observed in two other cases to be derived from the same source.

THE OCCIPITAL ARTERY.

The origin of the artery is usually opposite the facial, at the distance of about an inch from the division of the common carotid, but several cases are mentioned in the table in which it was higher or lower than this point. In plate 13, figures 3 and 6, the occipital artery is seen to arise above the ordinary situation, while in plate 15, fig. 2, it is given off from the bifurcation of the common carotid. The occipital is occasionally derived from the internal carotid (plate 14, fig. 6, and plate 15, fig. 4), and a few cases have occurred in which it continued from the ascending cervical branch of the inferior thyroid, and was thus derived from the subclavian artery (see the plates illustrative of the peculiarities of that artery).

The sterno-mastoid, splenius, and trachelo-mastoid muscles, cover the occipital artery in the course backwards to the occiput; it is, however, sometimes superficial to the last-named muscle, and in one or two cases it perforated the two first muscles, near their inner or posterior margins (table No. 135 R). A very rare variety is represented in plate 14, fig. 5, in which the chief branch of the occipital is superficial to the sterno-mastoid muscle, and but a very small artery is

deeply placed in the usual situation. The artery in a few cases turned backwards beneath the transverse process of the atlas, above which it usually lies.

Branches.—The variations of most importance to be noticed under this head, are the occasional origin of the posterior auricular and the pharyngeal from the occipital artery.

POSTERIOR AURICULAR ARTERY.

This artery is frequently very small in size, and I have seen it end as the stylo-mastoid branch. It is often a branch of the occipital.

TEMPORAL ARTERY.

The temporal artery is frequently tortuous; always so, to a certain extent, in aged persons. But few observations have been made on peculiarities of this vessel. The branches vary in size, and occasionally a very large one is directed forward above the zygoma to the upper part of the orbit. This unusual artery is seen in plate 14, fig. 4, to join with a small branch of the ophthalmic, and furnish large frontal branches.

INTERNAL MAXILLARY ARTERY.

This artery and the preceding are very constant in their origin. It was observed in two instances to take origin from the facial, from which it coursed upwards to pass beneath the ramus of the maxillary bone in the usual situation.

The internal maxillary artery is very frequently covered by the external pterygoid in the manner delineated in plate 13, fig. 7, instead of lying superficially to that muscle as shown in the ninth plate. In a few cases—e. g. 248, 254, 260, in the table—the vessel was seen to perforate the muscle exactly at the middle,—after having been for a very short space covered by it,—and then to incline forwards on the outer surface to enter the spheno-maxillary fossa in the usual way. It may be added, that I have seen the artery lodged in a notch which is often observable on the margin of the external pterygoid process of the sphenoid bone, and bound into it by a little fibrous structure.

Branches.—The only reference which is necessary to be made in this work to the branches is to their state in the remarkable case represented in plate 13, fig. 8. Two tortuous branches of the internal maxillary are there seen to enter the skull through the foramen rotundum and foramen ovale, and form an artery in the place of the internal carotid, which is altogether wanting; the internal carotid of the opposite side is considerably larger than usual.

PHARYNGEAL ARTERY.

The origin of this vessel was noted in 144 cases, which admit of being classified as follows :—

Cases in which the Artery arose from the bifurcation of Common Carotid	6	
Within ½ an inch above this point	20	
At ½ an inch	27	
Above ½ an inch, not exceeding 1 inch	50	
Above 1 inch (extreme height 2 inches)	9	
	——	112
Cases in which the Artery was given from an unusual source.		
From the Occipital	19	
From the Internal Carotid	9	
From a Linguo-facial branch	1	
	——	29
Cases in which there were more than one Pharyngeal branch		
Two brs. from Ext. Carotid	4	
Three brs. from Ext. Carotid	2	
Two brs., one from Occipital, 2nd from Ext. Carotid	2	
	——	8
Absence of the Pharyngeal Artery		
This variety was observed in		1

The pharyngeal artery and the inferior palatine branch of the facial co-operate in supplying the upper part of the pharynx, and sometimes the one, sometimes the other, is distributed to the soft palate. When the pharyngeal artery supplies the palate, the branch given from the facial in the usual situation of the palatine ends in the tonsil and in the neighbouring muscular structure. The tonsil is, according to the observations I have made, more frequently supplied by the inferior palatine or the artery in its situation, than by a separate offset of the facial.

The distribution of the pharyngeal artery to the soft palate, and the small size of the ascending palatine, are illustrated in

plate 10. In that figure the vessel is seen to divide into two branches immediately above the styloglossus muscle. The anterior and deeper branch was found on examination to ramify in the rectus major muscle and other structures in front of the vertebral column. The other branch, the larger of the two, subdivides into two parts, having different directions, the one vertical, the other horizontal; the former ascends to the cranial bones, the latter, which in the drawing arches inwards above the margin of the superior constrictor of the pharynx, supplied the soft palate, the Eustachian tube, and the tonsil. To these parts the horizontal branch was, on prosecuting the dissection, found to be distributed thus:—The higher division separated into two branches, which ramified under the mucous membrane of the fore part of the soft palate,—in the glandular and muscular structure; the lower division in like manner furnished branches to the soft palate under the mucous membrane of its posterior surface, and also supplied the Eustachian tube and the tonsil. The branch of the facial, which occupies the position of the inferior palatine, ended in the tonsil, as shown in the plate.

In plate 15, fig. 1, that which may be considered the opposite arrangement of the vessels is seen, for the inferior palatine extends to the soft palate, while the branches drooping inwards from the pharyngeal end on the side of the pharynx.

To afford an opportunity of repeatedly observing the distribution of the arteries in question, several careful dissections were made at different times; and from the notes of them taken at the moment, the following extracts are made.

(1.) The pharyngeal arises from the external carotid artery, and ascends vertically to the base of the skull, close to the internal carotid; in this course two branches are given inwards to the pharynx, and one to the rectus and longus colli muscles; at about the distance of an inch from the skull, the artery subdivides into three slender vessels. Of these one inclines back to the bone which it penetrates, the others arch down to the side of the pharynx.

The inferior palatine artery ascends from the beginning of the facial, between the stylo-glossus and the stylo-pharyngeus muscles, and soon divides into two parts: the anterior of

these spreads out in branches on the tonsil; the posterior, the larger of the two, arches over the superior constrictor of the pharynx to the soft palate. From the curve formed by the latter branch where it enters the pharynx a small artery is directed upwards to the Eustachian tube in which it ramifies together with an offset from the pharyngeal.

(2.) The pharyngeal of large size divides into two branches, one of which ascends behind the internal carotid artery to the bones of the skull, distributing branches to the nerves in its course upwards; the other branch, situated to the inner side of the internal carotid, supplies the side of the pharynx and enters to the soft palate above the superior constrictor.

A branch of the facial, the only one given in this situation, is directed upwards between the stylo-glossus and the stylo-pharyngeus muscles, and ends in the tonsil. This is the representative of the inferior palatine.

(3.) The arteries have the same disposition as in case 1, except that a separate branch is given from the facial to the tonsil.

(4.) The arrangement is the same as in the second case, with the exception that the facial artery distributes a small additional branch to the tonsil, so that here the gland receives two separate branches of the facial, viz. that which occupies the place of the ascending palatine, and that usually called tonsillar.

All the cases observed were either the same as the foregoing —those corresponding to the two first being the most frequent —or, as they presented but slight modifications, were easily referred to one or other of those conditions. The modifications of most frequency were those affecting the places of origin of the pharyngeal and the inferior palatine arteries, —points previously referred to. It may be added, that the last-named artery was occasionally seen behind and under the two muscles of the styloid process, and not as usual between them.

Lastly, the disposition of the vessels was in some cases found to be exactly the same on both sides of the body, while others presented examples of the opposite arrangements on the two sides.

SUBCLAVIAN ARTERIES AND THEIR BRANCHES.

The abbreviations which occur in the following table consist, as in the foregoing, in the omission of the last letters of the word: *e. g.* P. Scap. stands for Posterior Scapular; S. Scap. for Supra Scapular; Tr. Col. for Transversalis Colli; scal. for scalenus; m. for muscle, &c.

The word "usual," applied to the branches which arise to the inner side of the Scalenus muscle, implies that the Vertebral, Mammary, and Thyroid arteries were given off in that situation. In reference to the branches given under the muscle on the right side, it denotes that the Intercostal took origin there.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
1a	L	usual except Vert.			Vert. arises from the Aorta.
2a	L	usual.			Mam. from Th. axis.
3a	R	usual except Th.			Infer. Th. absent.
	L	usual except Th.			Infer. Th. absent.
11	R	usual.	usual.	P. Scap.	
13a	R			P. Scap.	Subclav. ascends $1\frac{1}{2}$ inch above clav.
13b	R				Vert. enters third cerv. verteb.
15	R	usual.	usual.	none.	
15a	R				Subclav. is not higher than clav.; it is covered in its whole length by st. mast. muscle.
16	R	usual.	usual.	a branch.	Subclav. not above clav.
19		usual.	usual.	P. Scap.	Subclav. little above clav.
19a	R	usual.	usual.	none.	Subclav. not above clav.
19b	L	usual.	Intercost.	none.	Subclav. not above clav. St. mast. muscle unusually thick at lower end, and broad at upper.
21	R	usual.	usual.	none.	Infer. Th. very large (Super. Th. small).
	L	usual except Vert.	Intercost.	none.	Infer. Th. small (Super. Th. large); Vert. from Aorta.
26	L	usual.	Intercost.	none.	Infer. Th. large. (See Table, p. 57).

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
28	R	usual.	usual.	none.	Subclav. ascends 1 inch above clav.
29a	R				Th. large.—Thyroid body enlarged.
	L				Th. absent, but a br. is given, instead, from Innom.
30a	R	usual.	usual.	none.	Cerv. ascend. becomes Occipl.
33	R				Scap. brs. are not given from Th.
41	R	usual except Th.			Subclav. given from descending Aorta, and crosses behind the œsoph. and the Com. Car. Th. is from Com. Car.; the br. in usual situation of Th., ramifies on trachea and œsophagus.
42	R				Subclav. fr. descending Aorta and crosses behind œsoph. and Com. Car.; no Infer. Th (Super. Th. large). Infer. lar. nerve not recurrent, and not behind Subclav.
	L	usual.			Infer. Th. small.
45	R	usual.	usual.	large P. Scap.	
47a		usual.	usual.		St. mast. muscle 3 inches broad at lower end.
48	R	usual.	usual.	S. Scap. & P. Scap.	S. Scap. and P. Scap. arise by a com. trunk on outer margin of 1st rib.
	L	usual.	Intercost.	P. Scap.	Mam. from Th.
50	L				Subclav. given from left side of Aortic arch, and directed very obliquely across to 1st rib.
51	R	usual.	usual.	none.	
52	R	usual.	usual.	P. Scap.	P. Scap. gives Prof.
	L			large P. Scap.	P. Scap. gives Prof.
53	R	usual.	usual.	none.	
	L			a large br.	
54	R	usual.	usual.	P. Scap.	
	L			none.	Vert. rises at dist. of ½ inch fr. origin of Subclav.
55	R		P. Sc. & Prof.	none.	Vert. small. Intercost. absent.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
57	R		usual.	a small br.	Subclav. does not ascend above clav.; S. Scap. and Tr. Col. by one trunk close to Th.
58	R			none.	Subclav. does not ascend above clav.
	L	usual.	Intercost.	none.	
59	R	usual.	usual.	none.	Subclav. ascends 1 inch above clav.
	L	usual.	Intercost.	none.	
60	R			none.	Subclav. ascends 1 inch above clav.
61	R	usual.	usual.	a large br.	
	L			a large br.	
63	R	usual.	usual.	none.	
	L	usual and Intercost.	P. Scap.	none.	
64	R			Tr. Col.	
65	R			none.	Subclav. ascends a little above clav.
66	R		usual and P. Scap.		Subclav. arches $1\frac{1}{2}$ inch above clav.; Tr. Col. by two brs. Superfic. Cer. with P. Scap. by one trunk close to Th.
67	R	usual, with S. Scap. and Superf. Cer.	usual and P. Scap.		Vert. large. S. Scap. and Superf. Cerv. by a com. trunk.
	L	usual, with Intercost., S. Scap., & Superf. Cer.	P. Scap.		Vert. small. S. Scap. and Superf. Cerv. by a com. trunk.
68	R	usual.	usual.	none.	
	L	usual.	Intercost.	none.	
69	R		usual and P. Scap.	none.	Subclav. ascends a little above clav.
	L		Intercost. & P. Scap.	none.	Subclav. ascends a little above clav. Vert. very small, and given from Th.
70	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	P. Scap.	
72	R	usual and S. Scap.	usual.	P. Scap. and another br.	Tr. Col. in two parts; Superfic. Cer. from Th. S. Scap. from Subclav. near Th.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
	L	usual and Intercost.	Tr. Col. and S. Scap.		No Scap. br. from Th.; 3 small separate brs. instead of Prof.
74	L	usual and Intercost.	none.	none.	Intercost. close to Vert.
75	R	usual.	usual.	none.	Subclav. ascends little above clav.: Vert. from lower aspect of Subclav., and turns up behind it.
	L	usual and S. Scap.	Intercost.	P. Scap.	Vert. as at R.; S. Scap. and Superfic. Cer. fr. Subclav. by a com. trunk which is close to Th.
76	L	usual.	Intercost.	none.	
77	R			both Scap. by common trunk.	Subclav. ascends little above clav.; it perforates scal. m.; 2 small brs. fr. Th. in place of Scap. brs.; S. Scap. under ligt. of scap.
	L	all brs.	none.	none.	Intercost. intern. to scal. m.
78	R	usual except Scap. brs.	usual.	Tr. Col. & S. Scap. by a common trunk.	Subclav. ascends little above clav.; Scap. brs. directly from Subclav. Vert. rises close to Innom.
	L	usual except Scap. brs.	Intercost.	S. Scap. & Tr. Col. by a common trunk.	Scap. arteries arise directly from Subclav.
80	R	all brs.	none.	none.	Tr. Col. separ. br. intern. to scal. m.; Intercost. intern. to same.
	L	all except Tr. Col.	Tr. Col.	none.	Tr. Col. separ. br.
82	R			P. Scap. & Prof. by a com. trunk.	
	L				Subclav. perforates scal. m. Mam. gives a br. across the lower part of the neck.
83	R	usual.	usual and P. Scap.	none.	Subclav. arches little above clav.
	L	usual and Intercost.	Tr. Col.	none.	
84	R	usual.	usual and Tr. Col.	none.	Prof. ascends from beneath the 1st rib.
	L			Tr. Col. & S. Scap.	No. Scap. br. from Th.; Prof. ascends from beneath the 1st rib.
86	R	usual and Intercost.	none.	P. Scap.	Vert. arises near the origin of Subclav.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
	L	usual.	Intercost.	none.	Th. small and gives no br. to thyroid body.
88	R	usual and Intercost.	P. Scap.	none.	
	L	usual and Intercost.	P. Scap.	uone.	
89	R	usual.	usual.	none.	
	L	usual except Vert.	Intercost. & P. Scap.		Vert. from Aorta.
90	R	usual.	usual and Tr. Col.	none.	
	L	usual.	Intercost.	nonc.	
91	R	usual.	Tr. Col. and usual.	none.	Subclav. ascends little above clav.; Intercost. and Prof. are separ. brs.
	L	all except Tr. Col.	Tr. Col.	nonc.	
93	R	usual.	P. Scap. and usual.	none.	
94	R	all.	none.	none.	Tr. Col. a separ. br. of Subclav.; Prof. is directed backwards between 6th and 7th vertebræ.
	L	all except Tr. Col.	Tr. Col.	none.	
96	R	usual.	P. Scap. and usual.	none.	Cerv. ascend. from Superf. Cerv.
	L	all.	none.	none.	
97	R	usual.	usual.	none.	Mam. from Th. axis.
99	R	usual except S. Scap.	usual.	none.	S. Scap. rises from the Axillary artery.
100	R	usual and Scap. brs.	usual.	none.	Tr. Col. and S. Scap. arise fr. Subclav. by a com. trunk which gives Cerv. ascend.
	L	usual and Intercost.	P. Scap.	none.	
101	R	usual with Scap. brs.	usual.	none.	Tr. Col. and S. Scap. arise fr. Subclav. by a com. trunk; Prof. continued from Ascend. cerv. and directed backwards betw. 4th and 5th vertebræ; Intercost. gives no Prof. br.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
101	L	all.	none.	none.	Mam. arises from Th. axis.
103	R		Tr. Col.	none.	Vert. arises close to origin of Subclav.; Th. gives Intercost. but not the Scap. brs., or Cerv. ascend., which (latter) is from Tr. Col. S. Scap. arises fr. Axillary and passes under lig. of scap.
104	R	usual and Intercost.	none but small brs. to intervert. foram.	a branch. (P. Scap. ?)	
	L	usual and Intercost.	P. Scap.	none.	
105	R	usual.	usual.	none.	
106	R	usual.	usual.	P. Scap.	Subclav. arches 1½ inch above clav.; Cerv. ascend. from Tr. Col.
	L	usual.	Intercost.	P. Scap.	P. Scap. rises on the 1st rib.
110	R	usual and Intercost.	none.	none.	The brs. are given at the distance of 1¼ inch fr. origin of Subclav.; Cerv. ascend. becomes Occipl.; Intercost. gives a br. to trachea.
	L	all.	none.	none.	Cerv. ascend. becomes the Occipl.
111	R	usual and Intercost.	small brs. to intervert. foram.	P. Scap.	Cerv. ascend. fr. S. Scap.
	L	usual and Intercost.	none.	P. Scap.	Mam. arises from Th. axis.
112	R	usual.	usual.	P. Scap.	
113	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	P. Scap.	
114	R	usual and Scap. brs.	usual.	none.	Vert. gives Th.; Tr. Col. and P. Scap. arise from Subclav. by a com. trunk.
	L				Th. is a separ. br.; Mam., Tr. Col., S. Scap. and Cerv. ascend. are given fr. one trunk.
116	R	usual with Intercost. and Prof.	none.	P. Scap.	Intercost. and Prof. are separ. brs. —latter passes between 6th and 7th vert.
	L	usual.	Intercost.	P. Scap.	

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
117	R	usual and Intercost.	none.	a br. to muscles.	Intercost. from Vert. and gives Prof. as usual.
	L	usual with Intercost. and Prof.	none.	P. Scap.	Prof. a separ. br. and passes between 6th and 7th vert.
119	L			S. Scap.	S. Scap. rises fr. Subclav. on 1st rib.
120	R	usual.	usual.	none.	S. Scap. from Axillary.
121	R	usual.	usual.	none.	Prof from Ascend. cerv. br. of Th. and passes between 4th and 5th vert.
	L	usual.	Intercost.	none.	Prof. same as on the right side.
122	R	usual.	usual.	P. Scap.	Prof. between 6th and 7th vert.
123	L	usual.	Intercost.	none.	Prof. small — deficiency compensated for by Cerv. ascend.
124	L	usual.	Intercost.	none.	
127	R	usual and S. Scap.	usual.	P. Scap.	S. Scap. a separ. br. (fr. Subclav.)
	L	usual.	Intercost.	none.	
129	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	P. Scap.	
130	R				Mam. from Th. axis.
131	R	usual.	Prof., Intercost. and P. Scap.	none.	Intercost. and Prof. are separate brs.
134	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	P. Scap.	
135	R	usual and Intercost.	P. Scap.	none.	
	L	usual.	Intercost.	none.	S. Scap. by a com. trunk with Tr. Col. (from Th.) and crosses the neck higher than usual.
136	R	usual.	usual.	none.	Prof. small.
	L	usual and Intercost.	none.	P. Scap.	Th. gives Mam. and a br. to trachea and œsophagus within the chest.
137	R	usual and Intercost.	none.	P. Scap.	Subclav. from descending Aorta and crosses behind œsophagus; Mam. from Th.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
138	R	usual with S. Scap. and Cerv. ascend.	usual.	Tr. Col.	Vert. rises near origin of Subclav.; S. Scap. and Cerv. ascend. are separ. brs. of Subclav.
139	L	usual.	Intercost.	uone.	Vert. small.
140	R	usual.	usual.	none.	
142	R	usual.	usual.	P. Scap.	Origin of Subclav. is low in the thorax.
145	R	usual and Intercost.	none.	P. Scap.	
145	L	usual.	Intercost.	P. Scap.	
146	R	usual and S. Scap.	usual.	none.	S. Scap. a separ. br. of Subclav.
147	L	Vert.	Intercost.	Th. and Mam.	Th. axis and Mam. are directed inwards over the anterior scalenus muscle.
149	L	usual and Intercost.	noue.	none.	
150	R	usual.	usual.	P. Scap.	
151	R	usual.	usual.	a large br.	
153	R	usual, with Intercost. and S. Scap.	none.	P. Scap.	Th. is a separ. br.; Mam. and S. Scap. arise by a com. trunk.
155	R	usual.	usual.	P. Scap.	
160	L	usual, with Intercost. & 3 small brs. to intervert. foram.	none.	P. Scap.	Vert. from near origin of Subclav. and enters 3rd vert.
167	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	P. Scap.	
169	R	usual.	usual.	P. Scap.	
170	R	usual.	usual.	P. Scap.	Subclav. arches 1 inch above clav.
	L	usual and Intercost.	none.	none.	Vert. from uear origin of Subclav.
173	R	usual.	usual.	none.	
173a	R	usual and Intercost.	nouc.	P. Scap.	

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
174	L	usual.	Intercost. and a br. to intervert. foram.	nonc.	
176	R	usual.	usual and 2 small brs.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual and Intercost.	1 br. of Tr. Col. (Superf. Cerv.)	a [2nd br. of Tr. Col. (P. Scap.?)	Prof. ascends from below 1st rib.
177	R	usual.	usual and P. Scap.	none.	Th. divides into 2 brs. before crossing beneath the Com. Car.
	L	Mam., Th. and Intercost.	1 br. of Tr. Col. (Superf. Cerv.)	2nd br. of Tr. Col.	Vert. from Aorta.
178	R	usual.	usual and P. Scap.		Distance to origin of brs. $\frac{4}{5}$ inch.
	L	usual and Intercost.	P. Scap.	none.	
179	R	usual.	Intercost. & P. Scap.		Sterno-mastoid m. is 3 inches broad at lower end and extends outside Subclav. artery. Distance to origin of brs. $\frac{7}{8}$ inch
180	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{4}{5}$ inch. Intercost. ascends from beneath 1st rib.
	L	usual and Intercost.	P. Scap.	none.	P. Scap. perforates post. scalen. m.
181	R	usual and Intercost.	small brs. to intervert. foram.	P. Scap.	Distance to origin of brs. $1\frac{1}{4}$ inch.
182	R	usual.	usual.	P. Scap.	Distance to origin of brs. 1 inch.
	L	usual.	Intercost.	P. Scap.	
183	R	usual.	usual.	P. Scap.	Subclav. perforates the anterior scalenus. Omo-hyoid m. arises from middle of clav. Distance to origin of brs. 1 inch. Superficial Cerv. from S. Scap.
	L	usual and Intercost.	P. Scap.	none.	Superficial Cerv. from S. Scap.
184	R	usual.	Intercost. & P. Scap.	none.	Distance to origin of brs. $\frac{3}{4}$ inch.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
	L	usual and Intercost.	none.	none.	Common trunk of Scapular arteries and the Mammary arise from Th. axis which is much dilated; Th. artery crosses behind Vert.
185	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{3}{4}$ inch.
	L	usual and Intercost.	P. Scap.	none.	Prof. is at first placed between the neck of 1st rib and tras. process of 1st dorsal vertebra.
186	R	usual.	Prof.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch. Intercost. given from Vert., descends through foramen in tras. process of 7th cerv. vert. and between necks of 3 ribs and tras. processes of 3 dorsal vertebræ.
	L	usual and Intercost.	P. Scap.		Vert. through foramen of 7th cerv. vert; Intercost. between the necks of 2 ribs and tras. processes of dorsal vertebræ.
187	R	usual.	usual.	none.	S. Scap. very small: its place on scapula is supplied by dorsal br. of Sub. Scap.
	L	usual and Intercost.	none.	P. Scap.	Th. very small—not supplying Th. body; S. Scap. not given from Th.
188	R	usual and com. trunk of Scap. brs.	usual and 2 small brs., which enter intervert. foramina.	none.	Scap. brs. by a common trunk which is joined to Mam.
	L	usual.	Intercost.	none.	Mam. united to Th. axis.
191	R	usual.	usual.	P. Scap.	Distance to 1st br. (Mam.) $\frac{1}{2}$ inch.
	L	usual.	Intercost. & a large br.	none.	The br. under scal. m. supplies muscles and gives the Prof.
192	R	usual.	usual.	P. Scap.	Distance to 1st br. (Vert.) $\frac{1}{2}$ inch: to others 1 inch. S. Scap. from Mam.
	L	usual.	Intercost. & P. Scap.	none.	Th. crosses behind Vert.; S. Scap. from Mam.
193	R	usual.	usual.	a br. on 1st rib to muscles.	
	L	usual and Intercost.	br. to intervert. foram.		Mam. joined to Th. axis at origin.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
194	R	usual.	usual.	P. Scap.	Brs. internal to scal. m. arise at nearly regular intervals; Prof. double, one above, the other below 1st rib.
	L	usual.	a large br. (P. Scap. ?)	none.	
195	R				Subclav. is covered by Carotid for 1 inch of its length; Th. absent (a br. from Innom. instead).
	L	usual.			Prof. ascends from beneath 1st rib.
196	R	usual and Prof.	Intercost.	none.	Mam. gives a br. directed transversely behind clav.
	L	usual and Prof.	a large br. (P. Scap. ?)	none.	The br. under scal. m. gives Intercost. and P. Scap.
198	L	usual, Intercost. and P. Scap.	none.	none.	
199	R	usual.	usual.	none.	Th. axis much enlarged.
	L	usual and Intercost.	a large br. (P. Scap. ?)		
200	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{5}{8}$ inch.
201	R	usual.	usual.	P. Scap.	
	L	usual.	Intercost.	none.	
202	L	usual and Intercost.	none.	none.	Th. small and does not supply th. body, which receives a br. from Innom. (Superior and Inferior Th. arteries on right side are of full size).
203	R	usual.	usual.	P. Scap.	Distance to origin of brs. nearly 1 inch; besides the usual br. Th. axis gives another br. to th. body over Com. Carotid.
204	R	usual.	usual.	a large br. (P. Scap. ?)	
	L	usual with Intercost. & Scap. brs.	none.	none.	Scap brs. arise by a com. trunk from Subclav.
205	L	usual and Intercost.	none.	none.	
206	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual.	Intercost.	P. Scap.	

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
207	R	usual.	usual.	none.	Distance to origin of brs. $1\frac{1}{8}$ inch.
	L	usual and Intercost.	none.	none.	Intercost. arises from Subclav. before the other brs.
208	R	usual.	usual and Tr. Col.	none.	Distance to origin of brs. $1\frac{1}{8}$ inch. Intercost. gives an unusual br., which runs along the œsophag. and trachea. Mam. furnishes a large Bronchial artery.
209	R	usual and Intercost.	none.	P. Scap.	Distance to origin of brs. $1\frac{1}{8}$ inch.
210	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch. Intercost. supplies one intercost. space. Prof. ascends from beneath 1st rib.
	L	usual.	Intercost. & P. Scap.	none.	Intercost. very small; Prof. ascends from beneath 1st rib.
211	R	usual.	usual.	none.	Distance to origin of brs. $\frac{1}{2}$ inch.
	L	usual and Intercost.	none.	P. Scap.	
213	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch; a small separate br. to trachea; Mam. from Th. axis; Intercost. and Prof. separate brs.
	L	usual and Intercost.	none.	none.	
214	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual and Intercost.	none.	P. Scap.	
215	R	usual.	usual.	P. Scap.	Distance to origin of brs. 1 inch; two brs. for Prof.—1st from Intercost., 2nd from Cerv. ascend.
	L	usual.	Intercost.	none.	Th. gives a br. turning inwards to œsophag.
216	R	usual.	usual.	P. Scap.	Th. arises separately at beginning of Subclav.
	L	usual and Intercost.	none.	P. Scap.	
217	R	usual and Intercost.	none.	none.	Mam. from Th. axis.
218	R	usual and Intercost.	none.	none.	Distance to origin of 1st br. (Vert.) $\frac{1}{2}$ inch.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
219	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch; Th. a separate br.; Mam. joined to Scap. brs.; Intercost. and Prof. separate brs.
	L	usual and Intercost.	none.	P. Scap.	Th. a separate br. Scap. brs. by a com. trunk.
220	R	usual.	usual.	P. Scap.	
	L	usual and Intercost.	P. Scap.	none.	
221	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{3}{4}$ inch.
222	R	usual.	two brs.	P. Scap. & S. Scap.	S. Scap. on 1st rib and passes under ligament of scapula.
223	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{3}{4}$ inch.
	L	usual.	Intercost.	none.	Mam. from Th. axis.
225	R	usual.	usual.	none.	Distance to 1st br. $\frac{7}{8}$ inch; a separate br. from Subclav. to trachea; Prof. ascends from beneath 1st rib; S. Scap. given from Sub-Scap.
226	R	usual.	usual.	P. Scap.	Distance to origin of brs. $1\frac{3}{8}$ inch.
228	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch.
229	R				Omo-hyoid m. arises from clavicle and covers the Subclav. artery beyond the scalenus m.
230	R	usual and Intercost.	none.	P. Scap.	Distance to origin of brs. $\frac{3}{4}$ inch.
	L	usual.	Intercost.	none.	
231	R	usual.	usual.	P. Scap.	Distance to origin of brs. $1\frac{1}{8}$ inch.
233	R	usual and Intercost.			Distance to origin of brs. $\frac{3}{4}$ inch.
	L	usual.	Intercost.		
234	R	usual and Intercost.			Subclav. arises to left of other brs. and crosses behind œsophag.; Cerv. ascend. becomes Occipl.
	L	usual and Intercost.	none.	P. Scap.	Cerv. ascend. becomes Occipl.; and on both sides it turns back beneath transverse process of atlas.
235	R	usual.	usual.		Distance to origin of brs. $1\frac{1}{8}$ inch; Prof. ascends from beneath 1st rib.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
236	R	usual and Intercost.	none.	none.	Distance to origin of 1st br. $\frac{3}{4}$ inch; two brs. from Th. axis to th. body—one under, the other over, Com. Carotid.
	L	usual and Intercost.	none.	none.	
237	R	usual.	usual.	a small br.	Distance to origin of brs. 1 inch; Prof. as two brs.—one from Intercost., the other from Th. (the latter is close at first to Cerv. ascend.)
238	R	usual.	usual.	usual.	Distance to origin of brs. $1\frac{1}{4}$ inch.
	L	usual.	Intercost.	none.	Prof. passes between transverse process of 1st dorsal verteb. and 1st rib.
240	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch.
242	R	usual and Intercost.	P. Scap.	none.	Distance to origin of brs. $\frac{7}{8}$ inch; Intercost. arises with the first brs.; P. Scap. through p. scal. m.
243	R	usual.	usual and P. Scap.	S. Scap.	Distance to origin of brs. I inch; S. Scap. on 1st rib and passes under lig. of scapula.
	L	usual and Intercost.	none.	P. Scap.	Mam. from Th. axis.
246	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual and Intercost.	none.	P. Scap.	
247	R	usual.	usual.	P. Scap.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual and Intercost.	none.	P. Scap.	
248	R	usual.	usual.	none.	Distance to origin of brs. I inch; the Scap. brs. scarcely joined to Th.
	L	usual and Intercost.	none.	none.	Scap. and Th. arteries arise separately.
249	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch.
	L	usual and Intercost.	none.	P. Scap.	
250	R	usual.	usual.		Subclav. arises low in chest and ascends close to Com. Car.; distance to origin of brs. $1\frac{1}{8}$ inch.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
251	L	usual and Intercost.	none.	none.	
252	R	usual.	usual and P. Scap.	none.	Distance to origin of brs. $\frac{5}{8}$ inch; Prof. as two brs.—one from Intercost., the other from the beginning of P. Scap.
253	R	usual.	usual.	noue.	
	L	usual and Intercost.	none.	none.	
254	L	usual and Intercost.	P. Scap.	none.	Prof. ascends from beneath 1st rib.
255	R	usual.	usual.	P. Scap.	Distance to origin of brs. $1\frac{1}{8}$ inch; Th. a separate br.; S. Scap. and Superficial cerv. by a com. trunk.
256	R	usual.	usual.	P. Scap.	Th. a separate br. from beginning of Subclav.; a second Th. from Com. Carotid near origin.
	L	usual.	Intercost.	P. Scap.	
257	R	usual.	usual.		Distance to origin of brs. 1 inch; Prof. as two brs.—one above, the other below the 1st rib.
	L	usual.	Intercost. & Prof.	none.	Intercost. and Prof. separate brs.
258	R	usual.	usual.	Tr. Col.	Distance to origin of brs. $1\frac{1}{4}$ inch.
	L	usual.	Intercost.	P. Scap.	Inferior Th. on both sides large, supplying the deficiency of Superior Th.
260	R	usual.	usual.	none.	Distance to origin of brs. $1\frac{1}{8}$ inch.
	L	usual.	Intercost. and Prof.	none.	Intercost. and Prof. merely joined at origin; Cerv. ascend. given from Tr. Col.
261	R	usual.	usual.	none.	Distance to origin of brs. $\frac{7}{8}$ inch. Vert. small.
262	L	usual.	Intercost.	none.	
264	R	usual.	Intercost. & P. Scap.		Distance to origin of brs. $\frac{7}{8}$ inch; Prof. as two brs.—one from Intercost. (small), the other (large) from Cerv. ascend.: latter turns back below 3rd vert.
265	R	usual.	usual.	none.	Distance to origin of brs. 1 inch; Intercost. supplies three spaces.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
265	L	usual with Intercost. & Prof.	none.	P. Scap.	Intercost. and Prof. joined at origin —former supplies one space.
268	R	usual.	usual.	none.	Distance to origin of brs. $1\frac{1}{8}$ inch; S. Scap. from Mam., which gives another branch ramifying on trachea and bronchial glands; Intercost. ramifies in three spaces.
	L	usual.	Intercost.	P. Scap.	Mam. gives a br. into chest as on right side. Prof. ascends from beneath 1st rib.
269	R	usual.	Intercost. & a branch to muscles.	none.	Distance to origin of brs. 1 inch; Intercost. supplies a branch wh. runs on the trachea to become a bronchial artery; Prof. ascends from beneath 1st rib.
270	R	usual.	usual and P. Scap.	none.	Distance to origin of brs. 1 inch.
	L	usual and Intercost.	none.	S. Scap.	A br. arches beneath Th. artery to œsophagus.
271	L	usual and Intercost.	P. Scap.	none.	Prof. ascends from beneath 1st rib.
272	R	usual.	usual.	none.	Intercost. gives a br. to œsophag. and trachea.
273	R	usual.	usual.	none.	Distance to origin of 1st br. (Th.) $\frac{3}{4}$ inch; Prof. as two brs.—one from Intercost. (small), the other from Cerv. ascend.
	L	usual except Scap. arteries.	small Prof.	P. Scap.	Th. gives no Scap. br.; S. Scap. from Axillary; Prof. as two brs.—one from Subclav. (small), the other from Cerv. ascend.: latter turns back below 3rd cerv. vert.—these brs. anastomose together.
275	R	Th. and Vert.	usual.	P. Scap. & Mam.	Distance to origin of brs. $\frac{5}{8}$ inch. P. Scap. is close to scal. m. Mam. one inch beyond it on 1st rib.
	L	usual exc. Mam.	Intercost.	a small P. Scap. and Mam.	P. Scap. touches outer margin of scalen. m.; Mam. arises from end of Subclav. and turns inwards under clav. and subclavius m.
276	L	usual.	Intercost.	none.	
277	R	usual.	usual.	P. Scap.	Vert. very close to Innom. at origin and it enters 4th vert.; Th. crosses behind it.

No.	Side of the Body.	Brs. internal to the anterior Scalenus muscle.	Brs. under the anterior Scalenus muscle.	Brs. beyond the anterior Scalenus muscle.	Peculiarities.
278	R	usual.	usual.	P. Scap.	Distance to origin of brs. 1 inch; Subclav. at first covered by Com. Carotid.
279	R	usual exc. Mam.	usual and P. Scap.	Mam.	Distance to origin of brs. 1¾ inch; Subclav. behind Com. Carotid at origin; Vert. arises close to Innom.
288	R	usual.	usual.	none.	Distance to origin of 1st br. (Vert.) 1¼ inch, Subclav. at origin covered by Com. Carotid.
289	R	usual.	usual.	none.	Distance to origin of brs. ¾ inch.
291	R	usual.	usual and P. Scap.	none.	Distance to origin of brs. ½ inch.
292	L	Vert. and Intercost.	none.	P. Scap., Th. & Mam.	
293	L	Vert. & a br. to œsophag.	Intercost.	Scap. brs., Cerv. ascend. and Mam.	Th. art. absent,—deficiency is compensated for by Super. Th. and a br. from Innom.
294	L	Th.	Intercost. with Mam., S. Scap. & Tr. Col.		Vert. from Aorta and in front of Th.; Scap. brs. and Mam. arise from a short trunk which perforates scal. muscle. Th. a separ. br.
295 296					In both these bodies the phrenic nerve, instead of being between the Subclav. artery and vein, is placed in front of the latter vessel.

Abstract of the foregoing table, so far as regards the branches which are derived from the Subclavian artery, where it is covered by the Scalenus, and where it is beyond or external to that muscle.

BRANCHES UNDER SCALENUS MUSCLE.

None	Right side	16		
	Left	34 —50	about 1 in.	$5\frac{1}{3}$
One	Right	112		
	Left	68—180	,, 1 in.	$1\frac{1}{2}$
Two	Right	21		
	Left	9— 30	,, 1 in.	$8\frac{4}{5}$
Three	Right	3		
	Left	1— 4	,, 1 in.	66
		———264		

BRANCHES BEYOND SCALENUS MUSCLE.

None	Right side	76		
	Left	66—142	about 1 in.	$1\frac{6}{7}$
One	Right	72		
	Left	40—112	,, 1 in.	$2\frac{1}{6}$
Two	Right	4		
	Left	3— 7	,, 1 in.	$37\frac{1}{2}$
Three	Right	0		
	Left	2— 2	,, 1 in.	131
		———263		

The observations contained in the table on the origin, the position, and course of the Subclavian arteries, as well as on the peculiarities of the branches, are reserved until they are severally under consideration.

EXPLANATION OF PLATE XVI.

The preparation to show the parts as they are represented in this plate consisted in the removal of the platysma myoides, the cervical fascia, with part of the sterno-cleido-mastoid, sterno-hyoid, omo-hyoid, and sterno-thyroid muscles. At the same time, the clavicular attachment of the trapezius was divided and the muscle turned back; a portion of the clavicle, after separation from the larger pectoral muscle, was removed, and, in consequence, the subclavius muscle lay exposed. The first rib was brought into view by detaching from it the inner end of the last-named muscle.

a Masseter muscle.
b Parotid gland.
c Digastric muscle.
d Stylo-hyoid.
e Sterno-cleido-mastoid.
f Sub-maxillary gland.
g Mylo-hyoid muscle.
h Hyoid bone.
i Thyroid cartilage.
k Sterno-hyoid muscle.
l Omo-hyoid.
m Sterno-thyroid.
n Crico-thyroid.
o Thyroid body.
p Trachea.
q M. Rectus anticus capitis major.
r ,, Scalenus anticus.
*r*¹ ,, ,, posticus.
s ,, Levator anguli Scapulæ.
t ,, Serratus magnus.
v ,, Trapezius.
w ,, Supra-spinatus.
x First rib.
y Clavicle.
*y*¹ M. Subclavius.
z ,, Pectoralis major.
*z*¹ Deltoid.

ARTERIES.

1. Innominate.
2. Common carotid.
3. Subclavian.
4. External carotid.
5. Internal carotid.
6. Superior thyroid. The offsets of the artery represented here are the hyoid branch directed inwards over the muscles below the hyoid bone; the laryngeal, which is concealed except at its origin by the thyro-hyoid muscle; a muscular branch seen to cross under the omo-hyoid muscle; and the continuation of the artery which supplies the thyroid body and the inferior constrictor muscle of the pharynx. Another small branch crosses the crico-thyroid membrane, and one given from the inferior thyroid artery emerges from under the thyroid body to aid the superior thyroid in supplying the anterior surface of that structure.
7. Lingual.
8. Facial.
9. Occipital.
10. Temporal.
11. Vertebral. In front of the artery is a portion of the accompanying vein.
12. Thyroid axis.
12¹. Inferior thyroid artery. This vessel where it crosses behind the common carotid artery and the vagus nerve is separated from them by fascia,—a portion of the sheath in which they and the internal jugular vein were lodged.

13. Internal mammary.
13¹. One of the perforating branches of the last-named artery.
14. Ascending cervical.
15. Supra-scapular. The branch which turns inwards from this artery over the sternal end of the clavicle is generally, if not constantly, found and is distributed to the muscles in this situation.
15¹. A branch (acromial) of the preceding : it crosses the supra-spinatus muscle (w.) and ramifies about the acromion.
16. A. Superficialis colli.
17. Posterior scapular.

VEINS.

18. Subclavian. | 19. Internal jugular.
20. External jugular.

NERVES.

21. Pneumogastric or n. vagus.
22. Phrenic.
23. Cervical—part of those which formed the cervical plexus.
34. Anterior branches of the lower cervical and first dorsal, directed outwards to form the brachial plexus.
25. A small branch which supplies the subclavius muscle, and gives a slender offset to join the phrenic nerve within the thorax.

EXPLANATION OF PLATE XVII.

The figure marked No. 1 is intended to show the innominate artery at its bifurcation, and the common carotid and subclavian arteries immediately after their origin, together with the veins and nerves which are in connexion with them above the sternum and the inner end of the clavicle. The sterno-cleido-mastoid muscle has been divided, one part is reflected upwards on the neck, and the lower end being turned down the sternal and clavicular attachments of the muscle, fall separately on the thorax. By the removal of a portion of the sterno-hyoid and of the sterno-thyroid muscle, the deep layer of the cervical fascia, which descends behind the sternum after covering the trachea and the large vessels, is exposed, and, by the excision of a portion of it, the vessels and nerves have been brought into view. The disposition of the more superficial part of the fascia on the muscles is also displayed.

In the figure No. 2, the third part of the subclavian artery is represented in connexion with the veins and nerves which are found in its neighbourhood.

The common integument together with a part of the

platysma myoides and the cervical fascia being removed, the supra-clavicular triangular space of anatomical writers is displayed; the sides of it are formed by the clavicle, the omo-hyoid muscle, and the sterno-cleido-mastoid or anterior scalenus.

a The cervical fascia.
b Sterno-cleido-mastoid muscle.
b[1] Sterno-cleido-mastoid muscle of the left side.
c Sterno-thyroid.
d Sterno-hyoid.
d[1] Left sterno-hyoid.
e Omo-hyoid.
f Anterior scalenus.
g Trapezius.

ARTERIES.

1. Innominate.
2. Common carotid.
3. Subclavian.
4. Supra-scapular.
5. A. Transversalis colli.

VEINS.

6. Internal jugular.
7. Anterior jugular.
8. The preceding vein terminating with the external jugular in the subclavian: the last-named vein is seen to a small extent above the clavicle.
9. Vertebral.
10. External jugular slightly drawn backwards to expose the subclavian artery: it receives, from under the trapezius muscle, the veins which correspond to the supra scapular and the transverse cervical (transversalis colli) arteries, and ends in the subclavian vein close to or in connexion with the anterior jugular (see also plate 2).

    A small vein which lies close to the subclavian artery, is in this case, joined to the external jugular; it is often present, but seldom of so large size as is here represented.
11. Supra-scapular; it follows the course of the artery of that name.
11[1]. The vein which accompanies the transverse cervical (transversalis colli) artery.

NERVES.

12. Pneumo-gastric or n. vagus; a cardiac nerve is seen to descend from it along the innominate artery.
13. Small branches of the sympathetic nerve.
14. The common trunk of some of the superficial branches of the cervical plexus.
15. The nerves descending to form the brachial plexus.
†. Lymphatic glands.

EXPLANATION OF PLATE XVIII.

a Masseter muscle.
b Digastric.
c Superior oblique (m. obliquus capitis superior).
d Inferior oblique (m. obl. cap. inferior).
e M. rectus cap. posticus major.
f Sterno-cleido-mastoid muscle.
g Anterior scalenus.
g[1] Posterior scalenus.
h M. semi-spinalis colli.
i A small part of the trapezius.
k Clavicle.
l Acromion (process of the scapula).
m Part of the omo-hyoid muscle.
n M. longus colli.

ARTERIES.

1. Arch of the aorta.
2. Innominate.
3. Right common carotid.
3¹. Left common carotid.
4. Right subclavian.
4¹. Left subclavian.
5. Right vertebral.
5¹. Left vertebral.
5†. Branch of the vertebral inosculating with the "Profunda cervicis."
5‡. A cervical branch of the same artery, of larger size than usual.
6. Internal mammary.
7. Thyroid axis.
7¹. Supra-scapular.
8. Superior intercostal of the right side.
8¹. Ditto of the left side.
8†. Posterior branch of the preceding.
9. "Profunda cervicis" of the right side.
9¹. Ditto of the left side.
10. Posterior scapular of the right side.
10¹. Ditto of the left side.
11. A small artery which distributes branches to the muscles, and along the nerves to the intervertebral foramina.
12. External carotid.
13. Internal carotid.
14. Facial.
15. Occipital.
15†. A branch of the preceding, with anastomoses with the vertebral and the "Profunda cervicis."
16. Posterior auricular.

NERVES.

17. One of the lower cervical placed between the anterior and posterior scalenus muscle.
18. Pneumogastric or n. vagus.

Figure 1.—During the delineation of this figure, the body was viewed from above. The appearance of the clavicle and scapula contrasts with that of the same parts in the succeeding plate where the delineation was made from a subject which had been raised more nearly to the level of the eye.

The deep artery of the neck (Ar. Profunda cervicis) of the left side is represented together with its inosculations with the vertebral and occipital arteries. To expose the vessel, the trapezius, the upper part of the sterno-cleido-mastoid, together with the splenius, the complexus, the trachelo-mastoid, and a portion of the lower end of the posterior scalenus muscles, were removed. The subclavian artery crosses over the first rib and under the clavicle. The intercostal artery takes origin from the subclavian behind the anterior scalenus muscle, and arches downwards into the thorax, after giving near its origin the "Profunda cervicis." The latter, being in this body at the origin of somewhat more than the usual size, inclines backwards between the neck of the first rib and the

transverse process of the seventh cervical vertebra, and is directed upwards on the semispinalis colli, distributing branches on each side, and approaching the spinous processes of the vertebræ. The veins which accompanied the artery, and the nerves (posterior branches of the cervical) which crossed it, were removed in the dissection.

Figure 2.—In this figure the cervical part of the right vertebral artery is shown, together with the small branches given from it in this situation—exclusively of those which enter the spinal canal.

On the left side, a portion of the rectus capitis anticus major (muscle) having been unintentionally left in connexion with the longus colli, the upper part of this muscle has the appearance of reaching to the base of the cranium. In consequence of this circumstance, that small part of the figure is in the state which Haller would have called "minus nitida."

EXPLANATION OF PLATE XIX.

a Superior muscle of the ear.
b Posterior.
c Occipital part of the occipito-frontal muscle.
*c*¹ Tendinous expansion, in which the fibres of the preceding end.
d Sterno-cleido-mastoid.
e M. splenius capitis.
*e*¹ Splenius colli.
f Trachelo-mastoid.
g M. obliquus capitis superior.
h Complexus.
i Levator anguli scapulæ.
k Serratus posticus superior.
l Rhomboid.
m Omohyoid.
n Spine of the scapula.
o Deltoid muscle.
p M. infra-spinatus.
q Long head of the m. triceps ex-tensor brachii.
r M. teres major.
s Latissimus dorsi.
t Trapezius.

ARTERIES.

1. Temporal.
2. Posterior auricular.
3. Occipital.
3¹. Cervical branch of the preceding; this artery descends along the trachelo-mastoid muscle under the splenius, and ramifies in the muscles near the transverse processes of the vertebræ.
3†. An offset from the last branch, which, after penetrating in the angular space bounded by the trachelo-mastoid, superior oblique, and complexus muscles (f, g, h), anastomoses with the vertebral artery and the "profunda cervicis,"—see plate 18, fig. 1.
4. Supra-scapular, exposed by the removal of the trapezius and the supra-spinatus muscles.
5. Superficialis colli, distributed beneath the trapezius.
5¹. A branch of the last-named artery ramifying under the integument.
6. Posterior scapular, which, in this case, divides into three branches under the levator anguli scapulæ muscle (6¹, 6†, 6‡).

6‡. This is the proper posterior scapular artery. It usually becomes concealed, as is represented in this plate, by the scapula, and ends beneath it in the serratus magnus muscle. Where it returns to view from under the scapula, the artery has been accidentally marked thus—6^{111}.

7. "Dorsalis scapulæ" division of the subscapular artery.

7^{1}. Another dorsal branch of the same.

7†. A small artery which communicates between the suhscapular and the supra-scapular arteries in front of the spine of the scapula.

8. The three lowest vessels thus marked are the posterior branches of intercostal arteries; the highest is derived from the "Profunda cervicis."

NERVES.

9. "N. occipitalis major" cut.,—being the large occipital branch of the first proper cervical.

10. The nerves which form the brachial plexus.

11. Supra-scapular.

By the separation of the integument from the greater part of the left side of the head, the superficial temporal, posterior auricular arteries, and a considerable part of the occipital have been exposed. The last-named artery is shown to a further extent by the excision of a small part of the sterno-cleido-mastoid and of the splenius muscles. It must be stated that the communicating branches between the arteries behind the ear are larger in this representation than they usually occur. The trapezius being divided close to its attachment to the clavicle and the spine of the scapula (to which bones a small portion of the muscle remains connected), and being then reflected towards the spine, the superficialis colli (5), with a larger transverse artery 6†, and the posterior branches of some of the intercostals, came into view. Finally, the scapular arteries —namely, the posterior scapular, the suprascapular, and the dorsal branch of the subscapular—have been shown by the removal to a greater or less extent of the rhomboid for the first-named, the supra-spinatus for the second, and the infra-spinatus and teres minor muscles for the third.

EXPLANATION OF PLATE XX.

a Thyroid cartilage.
b Trachea.
c Bronchus—in some cases the root of the lung.
d Œsophagus.
e Anterior scalenus muscle.
f Clavicle of the right side.
f^{1} Clavicle of the left side.
g Sterno-cleido-mastoid muscle.
h Heart.

ARTERIES.

1. Arch of the aorta—its ascending part.
2. Descending part of the aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Vertebral.
7. Thyroid.
7†. Ascending cervical branch of thyroid.
8. Internal mammary.
9. Supra-scapular.
10. Posterior scapular.
11¹. 2 Intercostal branches of the left side, given from the right subclavian.
12. Right intercostal—branches of the aorta.
12¹. Left intercostal—branches of the aorta.
13. Pulmonary.
13¹. Left pulmonary.
13†. Right pulmonary.
14. Canalis V. Ductus arteriosus.
14†. Ligamentum arteriosum.
14‡. A pouch, which ends in the left subclavian artery, and receives the attachment of the ligamentum arteriosum.

VEINS.

15. V. cava superior.
16. Right subclaviau.
17. End of the internal jugular. Near to this is the vertebral vein, which, in this case, has an unusual course behind the subclavian artery.

NERVES.

18. Pneumo-gastric, or n. vagus.
18†. Inferior laryngeal branch of the preceding.
19. Phrenic.
20. The branches which form the brachial plexus.

The figures of this plate illustrate some peculiarities of the innominate and the subclavian arteries.

Figure 1.—The left carotid is joined to a very short innominate artery.

Figure 2.—The innominate is not seen in the neck, and the right subclavian is but very slightly above the clavicle.

Figure 3.—The innominate and the right subclavian arteries contrast strongly with those in the figure immediately preceding.

Figure 4.—The right subclavian is covered at and immediately after its origin by the carotid.

Figure 5.—The right subclavian artery arises to the left of the other branches, and crosses obliquely to the first rib, immediately in front of the vertebral column, behind the œsophagus. The inferior laryngeal nerve has its usual course on the left side: it is seen to be directed transversely inwards to the larynx on the right side. The common carotid arteries take origin from a common trunk.

Figure 6 is taken from an essay by Adolphus Murray*.

* Anatomische Bemerkungen bey einer sonderbaren Stellung einiger grössern Pulsadernstämme unweit des Herzens, wie man solche in einem Leichname gefunden hat. In "Der K. Schwed. Acad. der Wissenschaften Abhandl.—übersetzt von A. G. Kastner," B. 30.

It shows the right subclavian artery arising lower down than in the preceding figure, and two intercostal branches of the left side (11[1]) given from it. The other intercostal arteries (12 and 12[1]) are branches of the aorta. In the original drawing, the internal mammary artery of the right side is delineated, and, in the accompanying essay, is described as arising from the axillary (end of the subclavian ?) artery, at the same time that the right vertebral is derived from the common carotid. It has not been considered necessary to extend the delineation so as to include the origin of the vessels referred to, inasmuch as facts of the same kind are shown in other plates.

The representation of the heart being unnecessary for our purpose, that organ has been omitted, and the appearance of the trachea, which in the original is so unlike that structure as to require comment by the author*, has been altered.

In Figure 7, the right subclavian artery passes from the left side of the aorta, between the trachea and œsophagus, to its usual position on the first rib. It is copied from one of those given of a remarkable case reported by Dr. Bayford†.

Figures 8 and 9 are introduced to illustrate a very unusual mode of origin of the left subclavian artery. They have been drawn from a preparation in the museum of Guy's Hospital‡.

Figures 10 and 11, which also have reference to the origin of the left subclavian artery, are taken from an essay by Klinkosch §.

All the figures of this plate will be farther described, and the objects of their introduction will be more fully stated, in the observations on the innominate and the subclavian arteries.

* "Besonders erinnere ich dass in der Abzeichnung der Theile die Luftröhre und der Larynx, weil der Zeichner solche Theile zu betrachten weniger gewohnt war, anders sind vorgestellt worden, als die Natur sie zeigt; welches ich doch habe dabey bewenden lassen, weil meine Anmerkungen diese Theile nicht betreffen."

† "An account of a singular case of obstructed deglutition"—in "Memoirs of the Medical Society of London," vol. ii. p. 275. London, 1794.

‡ The preparation has been with much liberality placed at my disposal by direction of the Treasurer, Mr. Harrison.

§ "Anatom. Partus Capite Monstroso,"—in "Dissertationes Medicæ Selectiores Pragenses," vol. i., p. 201. Pragæ et Dresdæ, 1775.

EXPLANATION OF PLATE XXI.

a Thyroid cartilage.
b Trachea.
b[1] Thyroid body.
c Anterior scalenus muscle.
d Posterior scalenus.

ARTERIES.

1. Ascending part of the arch of the aorta.
2. Descending part of the arch.
3. Innominate.
4. Right carotid.
4[1]. Left carotid.
5. Right subclavian.
5[1]. Left subclavian.
6. Vertebral.
7. Inferior thyroid. In figure 7 this mark is on the small artery, which arises in the situation of the thyroid, and in figures 1 and 10, on the thyroid axis.
8. Internal mammary.
9. Supra-scapular.
10. Posterior scapular — in some, ar. trans. colli.
10†. Superficial cervical (ar. cervic. superf.)
11. Ascending cervical (ar. cervic. ascend.)
12. Two muscular branches.
13. Superior intercostal.
14. Thyroid branch of the innominate (ar. thyroidea ima).

NERVES.

15. Those which form the brachial plexus.
16. Pneumo-gastric (nerv. vagus).
17. Phrenic.

The three first figures of this plate show the manner in which the subclavian arteries occasionally lie with respect to the anterior scalenus muscle.

The remaining figures illustrate some peculiarities in the position which the branches have at their origin.

Figure 1. The right subclavian perforates the anterior scalenus muscle. Nearly an equal portion of the muscle was interposed on the one side between the artery and the nerves, on the other between it and the vein.

Figure 2. The left subclavian artery has the same position in the scalenus muscle as in the preceding figure, and is accompanied by one of the large nerves which go to form the brachial plexus.

Figure 3*. The left subclavian artery is in front of the muscle, and it lay in contact with the subclavian vein. The nerves which had been in their usual position between the two scaleni muscles, were removed from the preparation.

* Drawn from a preparation in the museum of St. Bartholomew's Hospital.

Figure 4. The drawing is intended to show the distance at which the branches sometimes arise, from the commencement of the right subclavian artery. The superior intercostal artery here occupies an unusual position, being given from the subclavian to the inner side of the scalenus.

Figure 5. This is an example of a very rare condition of the branches. The number is greater than usual, and they are diffused over the first part of the trunk. The thyroid axis has been subjected to a sort of decomposition, and its constituents—the ascending cervical, thyroid, and scapular branches—arise separately from the subclavian artery.

Figure 6. The chief peculiarity here represented is the passage outwards—so to express the fact of their origin being external to its usual position—of some of the branches. The internal mammary, the transverse cervical, and the suprascapular branches, are given from a common trunk which perforates the anterior scalenus muscle. The left vertebral being at the same time given from the aorta, no branch arises from the subclavian internally to the scalenus muscle, with the exception of the inferior thyroid.

Figures 7 and 8. The branches are moved still farther out than in the preceding figure.

In the seventh drawing considerable branches arise at three different points in the space between the scalenus muscle and the outer margin of the first rib; the first is a trunk common to the scapular and the ascending cervical arteries: the second is the internal mammary: lastly, two muscular branches arise close together. Other peculiarities of the sketch require notice, namely, those of the thyroid artery, and of the phrenic nerve. The branch given from the subclavian in the position usually occupied by the thyroid, is very small, and does not reach the thyroid body, which receives, instead, a branch from the innominate. The phrenic nerve turns round the large branch external to the scalenus.

In the eighth figure the vessels given beyond the scalenus muscle are two in number, and of unequal size. The first is the larger, and furnishes the inferior thyroid, ascending cervical, internal mammary, and transverse cervical branches. The second is the posterior scapular.

Figures 9 and 10 have been introduced as examples of the origin, from the commencement of the subclavian artery, of branches which ordinarily take their rise close to the scalenus muscle.

In the ninth figure, the inferior thyroid artery, being as it were set free from the common trunk of the scapular and ascending cervical branches, has taken the unusual position.

The vertebral artery is the branch given near the origin of the subclavian in the tenth figure, and in it also the internal mammary takes rise on the first rib.

EXPLANATION OF PLATE XXII.

a Thyroid cartilage.
b Trachea.
*b*¹ Thyroid body.
c Anterior scalenus muscle.

ARTERIES.

1. Right side of the arch of the aorta.
2. Left side of the arch of the aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Right vertebral.
6¹. Left vertebral.
6†. A second left vertebral arising from the subclavian.
6‡. Left vertebral arising from the aorta.
6*. Small branches given from the left subclavian in positions which the origin of the vertebral artery sometimes occupies; they entered the intervertebral foramina.
7. Thyroid axis.
7†. Inferior thyroid taking origin from the vertebral.
8. Internal mammary.
9. Transverse cervical (ar. transv. colli.)
10. Supra-scapular.
11. Ascending cervical (ar. cervic. ascend.)
12. Right superior intercostal.
12¹. Left superior intercostal.
12†. First aortic intercostal.
13. Deep cervical (ar. profunda cervicis.)

Various conditions of the vertebral arteries are illustrated in this plate.

Figure 1. The difference of size, which sometimes exists between the arteries of the opposite sides, is shown.

Figures 2, 3, and 4 are introduced to point out the gradual descent of the left vertebral from the usual position of its origin —the angle formed on the left subclavian artery—to the aorta.

Figure 5. The left vertebral enters the last cervical vertebra. On the right side the superior intercostal artery is derived from the vertebral, and passes downwards into the thorax through the foramen in the transverse process of the seventh cervical vertebra, and afterwards between the necks of the ribs and the corresponding transverse processes of the dorsal vertebræ. It will be observed that the superior intercostal of the other side descends also between the ribs and the processes of the vertebræ ; and that the first aortic intercostal branch occupies a similar position in reference to the bones.

Figure 6. The inferior thyroid artery of the left side arises from the vertebral which is given directly from the aorta.

In figures 7, 8, and 9, and figure 2 of plate 24, the vertebral artery is constituted by the union of two branches—in one case, three branches,—which arise in different positions and unite into a single vessel at various points.

Figure 7*. One of the two arteries arises from the subclavian in the position usually occupied by the origin of the vertebral, the other is given from the aorta, and the union between them took place before either had entered the foramina in the vertebræ.

Figure 8. The roots—so to call them—of the artery take origin as in the preceding representation ; but the union occurs after one has passed through the foramen of a vertebra.

Figure 9†. Both roots spring from the subclavian and unite after one has ascended through two vertebral foramina.

Figure 10 has been added with a view to explain the conjecture which may reasonably be formed as to the mode of formation of the variations in the vertebral and other arteries. The left vertebral is given from the aorta, and two small arteries are derived from the subclavian, in situations in which the origin of that vessel is often placed.

In the cases represented in the preceding figures, the double origin of the vertebral artery occurs on the left side. In plate 24, figure 2, the vessel is seen to result from the union of three arteries and on the right side.

* Taken from a drawing of Huber's in the "Acta Helvet." loc. cit.—Part of the original has not been included in this sketch.

† Drawn with the kind permission of the owner, from a preparation in the possession of Dr. Catley, of Delaware, Ohio, during his temporary residence in London.

EXPLANATION OF PLATE XXIII.

a Thyroid cartilage.
a† Hyoid bone.
a‡ Epiglottis.
b Trachea.
b[1] Thyroid body.
c Anterior scalenus muscle of the right side.
c[1] Anterior scalenus muscle of the left side.

ARTERIES.

1. Ascending part of the arch of the aorta.
2. Descending part of the arch of the aorta.
3. Innominate.
4. Right carotid.
4[1]. Left carotid.
5. Right subclavian.
5[1]. Left subclavian.
6. Right superior thyroid.
6[1]. Left superior thyroid.
6‡. Branch on the crico-thyroid membrane.
7. Right inferior thyroid.
7[1]. Left inferior thyroid.
7†. An additional inferior thyroid, given from the subclavian.
7‡. Thyroid artery derived from the innominate (ar. thyroidea ima).—In figure 10, the artery arises from the lower part of the right carotid.
8. & 8[1]. Superior laryngeal.
9. Right vertebral.
9[1]. Left vertebral.
10. Right internal mammary.
10[1]. Left internal mammary.
11. Right ascending cervical.
11[1]. Left ascending cervical.
12. Supra scapular.
13. Transverse cervical (ar. transversalis colli).—In the first figure this mark is placed on the posterior scapular.

NERVES.

14. Pneumo-gastric.—N. vagus.
15. The lower cervical nerves and the first dorsal which form the brachial plexus.

It has been accidentally omitted to mark the superior laryngeal nerve in figure 5.

Different conditions of the thyroid arteries are represented in this plate; variations of the origin of these vessels have been illustrated in the plates of the external carotid and the subclavian arteries.

Figure 1.—The thyroid artery of the right side gives a large branch, which crosses to the left side of the thyroid body, and in its course lies on the crico-thyroid ligament.

Figure 2.—Both superior arteries are very defective, and the inferior distribute considerable branches to the anterior surface of the thyroid body to supply the defect. The vicarious branch—thus to term it—on the right side emerges from beneath the upper part of the body and descends in front of it: that on the left side is directed from below upwards.

Figure 3.—The reverse of the arrangement of figure 2 is exhibited in the arteries of this drawing. The left inferior thyroid is wanting, and its place is taken, at the posterior surface of the thyroid body, by a large branch of the superior—the course being shown by the dotted line.

Figure 4.—The laryngeal branch of the left superior thyroid takes an unusual course—through the thyroid cartilage.

Figure 5.—The laryngeal artery reaches the interior of the larynx at the outer margin of the crico-thyroid ligament.

Figure 6*.—In this figure the thyroid body is larger than usual. The laryngeal artery is of very unusual size. It runs along the inner side of the thyroid cartilage and, escaping by the side of the crico-thyroid ligament, ends in the thyroid body.

The remaining figures of this plate, and the first figure of plate 24, are examples of unusual inferior thyroid arteries. They arise in various situations and differ very much in their size, and to some extent in the manner of their distribution.

In figure 7, the unusual artery takes the place chiefly of the left inferior thyroid, which may be considered to be absent: for the small artery in its situation is distributed only to the œsophagus, and the muscles in front of the spinal column.

Figure 8.—The peculiarities in the arteries are these:—The inferior thyroid of the right side is altogether wanting, and the defect is supplied by a branch given from the innominate. The right superior thyroid gives a large branch, which crosses over the crico-thyroid ligament and joins the artery on the opposite side.

Figure 9.—The thyroid body was very large, and, to a considerable extent, ossified. Both the superior arteries are very small; and on the right side there is no inferior thyroid in the usual situation. A branch of unusually large size, furnished by the innominate, ramifies on each side over the thyroid body, to make up for the insufficiency of the arteries which usually ramify over its anterior surface. A branch is also seen to pass behind the left side of the thyroid body,

* Taken from one of two figures of the same preparation, published by Professor Arnold, in his "Bemerkungen über den Bau des Hirns und Rückenmarks, &c. mit Abbildungen."—Zurich, 1838.

where it takes the place of the vessel that is ordinarily in this situation.

Figure 10.—There are here five thyroid arteries. The additional branch is derived from the lower end of the right common carotid.

Figure 11.—In this figure also there is a fifth thyroid artery, which arises from the right subclavian and crosses over the common carotid, at the same time that the usual inferior thyroid artery occupies its accustomed place behind that vessel.

In the first figure of plate 24, the right inferior thyroid artery is seen to be given from the common carotid at some distance from the origin of the latter.

EXPLANATION OF PLATE XXIV.

a End of the transverse process of the atlas.
b Trapezius muscle.
c Splenius.
d Complexus.
e Trachelo-mastoid.
f Levator anguli scapulæ.
g Anterior scalenus.
g† Posterior scalenus.
h Digastric.
i Submaxillary gland.
k Mylo-hyoid muscle.
l Hyoid bone.
m Thyroid cartilage.
n Thyroid body.
o Trachea.
p Clavicle.
q Subclavius muscle.
r The first rib of the right side.
r[1] The first rib of the left side.
s Scapula.
s† The glenoid cavity of the scapula.
t The coracoid process of the same bone.
u Omo-hyoid muscle.
v Subscapular.
w Tendon of the latissimus dorsi.
x Biceps.
y Coraco-brachialis.
z The head of the humerus covered by the capsular ligament.
† The long head of the triceps muscle.
‡ The tendon of the larger pectoral.

ARTERIES.

1. Ascending part of the arch of the aorta.
2. Descending part of the arch.
3. Innominate.
4. Right carotid.
4[1]. Left carotid.
5. Right subclavian.
5[1]. Left subclavian.
6. Right vertebral.
6[1]. Left vertebral.
6[a]. 6[b]. 6[c]. Three branches which unite to form the vertebral artery in figure 2.
7. Right inferior thyroid. It is placed on the thyroid axis in figure 3.
7[1]. Left inferior thyroid.
7†. Ascending cervical (Ar. cerv. ascendens). In fig. 3 it arises with the transverse cervical—by a common trunk—and turns backwards below the transverse process of the atlas—to become the occipital.
7‡. Right inferior thyroid derived from the common carotid.
8. Right internal mammary.

8¹. Left internal mammary.
8†. Bronchial — derived from the internal mammary.
9. Supra-scapular.
10. Superior intercostal.
10†. A branch of the last named artery; it arches inwards to the side of the œsophagus on which it ramifies within the thorax.
11. & 11¹. Posterior scapular—in figure 3 this mark is placed on the transverse cervical.
12. External carotid.
13. Internal carotid.
14. Superior thyroid.
15. Axillary.
16. Sub-scapular.

NERVES.

17. Those which form the brachial plexus.
18. Supra-scapular.

Figure 1 is supplemental to those contained in plate 23. The right inferior thyroid artery arises from the common carotid, instead of taking its origin from the subclavian.

Figure 2 *. In this figure is represented a very unusual arrangement of the right vertebral artery which results from the union of three branches.

Figure 3. The ascending cervical is much enlarged, and takes the place of the occipital artery. It arises with the transverse cervical instead of being given from the inferior thyroid artery, and is directed backwards to the occiput below the transverse process of the atlas—the usual course of the occipital being above that bone.

Figure 4. The internal mammary arteries take origin at both sides beyond the scalenus, but at different distances from that muscle. On the right side the origin of the vessel is on the inner margin of the first rib: on the left, it is beyond the outer margin of the same bone, and on this side the clavicle has been slightly raised to expose the artery.

Figure 5. Two unusual arteries are seen in this drawing to descend into the thorax. One, arising from the internal mammary, is a bronchial artery. The other is derived from the commencement of the superior intercostal, and ramifies on the œsophagus, and in front of the vertebral column.

Figure 6. The supra-scapular artery is given from the internal mammary.

Figure 7. The supra-scapular is a branch of the axillary artery.

* Copied from a drawing which accompanies a paper by A. Meckel. It is entitled "Anatomische Bemerkungen," and is contained in J. F. Meckel's "Archiv. für Anatom. und Physiologie."—1828.

EXPLANATION OF PLATE XXV.

a Digastric muscle.
b Hyoid bone.
c Thyroid cartilage.
c† Thyroid body.
d Trachea.
e Sterno-hyoid muscle.
e† Omo-hyoid.
f Sterno-cleido-mastoid.
g Trapezius.
g† A muscular slip originating from the trapezius, and joining the under surface of the sterno-cleido-mastoid.
h Anterior scalenus.
h† Posterior scalenus.
i Levator anguli scapulæ.
k Clavicle.
l Deltoid muscle.
m Larger pectoral.
n Coracoid process of the scapula.
n† Coracoid ligament (Lig. propr. posticum scapulæ).
o Subscapular muscle.
p Head of the humerus covered by the capsular ligament of the shoulder joint.
q Tendon, the latissimus dorsi (muscle).
q† Teres-major.
r Biceps.
s Coraco-brachialis.
t Tendon of the larger pectoral.
v Triceps.
w First rib of the right side.
w^1 First rib of the left side.
x "Cervical rib" of the right side connected at the outer end to a projection on the first rib.
x^1 A rudimentary cervical rib on the left side.
y Last cervical vertebra.
z First dorsal vertebra.

ARTERIES.

1. Ascending part of the arch of the aorta.
2. Descending part of the arch of the aorta.
3. Innominate.
4. Right carotid.
4¹. Left carotid.
5. Right subclavian.
5¹. Left subclavian.
6. Right vertebral.
6†. Left vertebral given from the aorta.
7. Inferior thyroid.
8. Internal mammary.
9. Supra-scapular.
10. Transverse cervical (Ar. trans. colli.)
11. Ascending cervical (Ar. cervicalis ascendens).
11†. A branch of the preceding directed behind the transverse process of the vertebræ, to take the place of the deep artery (ar. profunda cerv.) at the upper part of the neck.
12. Superior intercostal.
12†. Deep cervical (ar. profunda cerv.)
13. External carotid.
14. Internal carotid.
15. A branch of the superior thyroid descending to the sternal end of the clavicle.
16. Axillary.
17. Subscapular.

VEINS.

18. Right internal jugular.
18¹. Left internal jugular.
19. Right external jugular.
19¹. Left external jugular.
20. Right subclavian.
20¹. Left subclavian.
21. Right innominate.
21¹. Left innominate.
22. V. Cava superior.
23. Cephalic.

Figure 1.—The Supra scapular artery—of whose origin some variations are represented in plate 24—is here seen to

be derived from the subscapular branch of the axillary, and to pass beneath the posterior proper ligament of the scapula.

Figures 2 and 3 are illustrations of some of the peculiarities of the deep artery of the neck (ar. profunda cerv.). In the former, the artery ascends on the right side from beneath the transverse process of the first, and on the left side from beneath that of the second dorsal vertebra. It was on both sides as usual a branch of the superior intercostal, but each took origin opposite the point at which it becomes apparent behind.

In the latter figure (3), the deep cervical passes backwards in the most frequent position, but it is of much less than the ordinary size, and the defect is supplied by a considerable off-set from the ascending cervical branch of the inferior thyroid. Several instances of this arrangement are recorded in the table.

The small artery which arises from the superior intercostal, close to the deep cervical, was distributed to the spinal canal.

The remaining figures of this plate have been drawn on a reduced scale.

Figures 4 and 5 have reference to the veins. In one, the external jugular descends over the clavicle, and in the preparation it was seen to join the subclavian after turning round that bone, between it and the subclavius muscle. In the other sketch the cephalic vein crosses the clavicle, and terminates in the external jugular.

Figure 6.—This is a representation of one of two cases in which the phrenic nerve, instead of lying between the subclavian artery and vein, was placed in front of the vein.

Figure 7.—This drawing has been taken from a body in which there was no interval between the trapezius and the sterno cleido mastoid muscles.

Figure 8.—Other peculiarities of the muscles, in connexion with the subclavian artery, are delineated in this sketch. The omohyoid arises from the clavicle, and nearly covers the large artery—an arrangement of the muscle not of unfrequent occurrence. A small muscular slip is also seen to extend from the trapezius and join the under surface of the sterno-

cleido-mastoid near the clavicle. I have seen this unusual band of fibres perforate the omohyoid muscle.

Figure 9 has been taken from a preparation in the Anatomical Museum of the University of Cambridge*. It is introduced to illustrate the probable position of a "cervical rib," with respect to the subclavian artery. The vertebræ represented, are the seventh cervical and the first dorsal. With the former there is connected on each side a slightly moveable process. That of the left side is short; the process of the right side reaches to a considerable distance, and is united to a tuberosity raised from about the middle of the first ordinary rib. These cervical ribs—as they are termed—are obviously an extension of the piece which usually forms the anterior boundary of the foramen in the transverse process of the vertebra. As the piece referred to is developed from a separate osseous centre, and is therefore always distinct at an early period of life, the condition of the bones represented in the drawing is to be regarded as the persistence of an original state with an increased growth of the part.

THE SUBCLAVIAN ARTERIES.

The observations on the subclavian arteries and their branches will be arranged under the following heads:—

A. The origin and course of the artery of the right side when derived from the innominate.

B. The origin and course of the same artery when it arises as a separate offset of the aorta.

C. Peculiarities in the origin and course of the left subclavian.

D. The position of the origin of the branches generally.

E. Peculiarities of the branches individually.

F. Some peculiarities of the veins, nerves, and muscles in connexion with the subclavian arteries.

* Professor Clark not only gave me, in the examination of the museum, the advantage of his personal acquaintance with the objects in it, but even took the trouble to make drawings of this and other preparations for the purposes of this work. I am deeply sensible of his great courtesy and kindness.

A. *The origin and course of the right subclavian artery, when derived from the innominate.* The position of the commencement of the artery necessarily varies—as has been stated of the common carotid, and for the same reason—with the situation in which the innominate bifurcates; and is, therefore, in the great majority of cases situated on a level with the upper margin of the clavicle, at its sternal end or near that point (see abstract of the table, ante page 39, and pl. 16). The vessel, however, takes its rise in some instances within the thorax; this is recorded in the table of nine cases, and it is illustrated in plate 5, fig. 2, and plate 20, fig. 2. In a few cases, on the contrary—seven are recorded in the table,—in consequence of the innominate extending higher than usual, the subclavian arose at some distance upwards in the neck (plate 20, fig. 3).

In most cases the subclavian and carotid arteries of the right side lie at their origin on the same plane and equally near to the integuments: not unfrequently, however, the origin of the subclavian is covered to a greater or less extent—in some cases partially, in a few completely—by the common carotid. My attention was first drawn to this fact by the preparation from which the fig. 4, plate 20 has been taken; in it, the commencement of the subclavian is not only behind but even somewhat to the inner or tracheal side of the carotid. When the arteries have the relative position here pointed out, they are separated by a process of the cervical fascia—the general investing membrane of the vessels and other structures of the neck—so that, after the carotid has been turned aside, this membrane must be divided before the subclavian is brought into view.

The extent to which the subclavian artery arches into the neck, has so direct an influence on the accessibility of the vessel during a surgical operation, especially when the clavicle is elevated, as it usually is in cases of aneurism in the axilla, that the height becomes an important consideration in its anatomical history. It is obvious that in the case represented in plate 20, fig. 3, no degree of elevation of the clavicle that could have occurred, in consequence of the presence of a tumor in the axilla, would have caused the bone to be raised above the artery. On the contrary, the artery and the bone lie so

nearly on a level, in the second figure of the same plate, that if the shoulder were slightly raised the former would be deeply placed and difficult of access; and its depth, and the difficulty to be encountered in the operation for carrying a ligature round it, would increase in direct proportion to the elevation of the clavicle.

In a few cases—twenty-five—the relative position of the artery and the clavicle was noted, and gave the following result:—

The artery was not higher than the clavicle in	6
was slightly higher in	11
was ½ inch, and not exceeding 1 inch higher in	4
more than 1 inch, not exceeding 1½ inch in	4
	25

The size of the muscles and the quantity of subcutaneous fat have also, as in other parts of the body, their influence on the depth of this artery; and I am disposed to adopt the statement of Dupuytren as to the effect of the direction of the shoulders likewise. "The third part of the subclavian artery," says that celebrated surgeon, "lies near the skin in those who are thin and have slender and long necks with lean and pendent shoulders; it is, on the contrary, deeply hidden in persons who have short, thick necks and muscular shoulders," &c.* It should, however, be understood that my opinion as to the correctness of this statement is founded on the observation, with special reference to this point, of only a few cases, and on the general impression existing on my mind, and that it is not an inference from such a number of carefully examined bodies as would warrant entire reliance on its accuracy. There is no evidence that Dupuytren's statement has any better foundation.

In a few cases—and with the same frequency on both sides of the body—the subclavian artery perforated the anterior scalenus muscle; it was, therefore, separated by a smaller interval than usual from the subclavian vein, and probably the margin of the muscle would not have been a guide to the position of the vessel. See plate 21, fig. 1. A case is represented, in the second figure of the same plate, in which the artery when placed in this unusual position—in the substance

* Leçons Orales, par M. le Baron Dupuytren, tome iv., p. 528.

of the scalenus muscle—was accompanied by one of the large nerves which form the brachial plexus. A still further departure of the artery from its ordinary position is, where it lies altogether anterior to the muscle—close to the subclavian vein and the phrenic nerve. The disposition last mentioned has not been present in any of the bodies which I have observed: the illustration given of it—plate 21, fig. 3,—has been taken from a preparation in the museum of St. Bartholomew's Hospital. In this case the artery lay in contact with the vein, and the lower cervical nerves were in the usual situation, behind the anterior scalenus muscle. Manec * and Velpeau † mention similar cases.

B. *The origin and course of the right subclavian artery when it arises directly from the aorta.* In the observations made on the large branches given from the arch of the aorta, it has been shown that the innominate artery is sometimes altogether wanting, and that the subclavian is, in such cases, a separate offset of the aorta. When given thus, as an independent branch, the subclavian varies as to the position in which it takes its origin with reference to the other branches—sometimes preceding them—occasionally, but rarely, occurring as the second or the third of four (ante page 47 and plate 6, figs. 10, 11, and 12) but most frequently being the last of the branches. These unusual cases severally require examination in respect to their course and connexions.

1. When the subclavian is the first branch of the arch it occupies the position of the innominate, and may be supposed to lie with regard to neighbouring parts as that artery usually does.

2. In the instance—probably the only one hitherto observed—in which the subclavian followed immediately after the right carotid, it was found to proceed to its destination behind that vessel ‡.

3. In one of two cases in which the subclavian arose after both carotid arteries, the position with respect to the right

* Traité Théorique et Pratique de la Ligature des Artères. Planche 3.—Paris, 1832.

† Traité Complet d'Anatomie Chirurgicale, &c. Edit. 2. Tome i., p. 494.—Paris, 1833.

‡ "Pone Carotidem sui lateris incedens." Huber. loco cit. et ante p. 47—note.

carotid was the same as in that last referred to—see plate 7, fig. 2; in the other, on the contrary, it is stated by the observer (Walter) to have been directed to the right side, in front of the other branches and of the trachea.

4. The position which the artery under consideration occupies on the aorta when it springs on the left side, beyond all the other branches, is not constant. Thus, in some cases, it is seen to take rise from the upper part of the arch—as in plate 7, figs. 5 and 11, and plate 20, fig. 5;—in others it is derived from the posterior aspect of the arch—plate 6, fig. 13, and plate 20, fig. 7;—lastly, the origin may be found much lower down, even from the descending aorta, as shown in a case represented at plate 20, fig. 6, which probably stands alone both in respect to the depth at which the subclavian artery arises and to the circumstance of two intercostal arteries being given from it near the origin.

The course of the subclavian artery from the left side of the aorta to its destination is, in a great majority of cases, oblique, in front of the vertebral column, between this and the œsophagus *. Inasmuch as examples of this disposition of the vessel are to be found in most museums of anatomy, and the instances recorded by writers are so numerous, that a special reference to them would be tedious and useless, I will only add, in reference to the frequency with which it is likely to occur, that in the bodies which have come under my notice—

* It is remarkable that Walter, in describing one of his figures, in which the right subclavian arises beyond the other branches, as shown in plate 7, fig. 5, erroneously, in my opinion, speaks of that vessel as crossing in front of the trachea. "Cette souclavière droite est précisément très-remarquable et le plus souvent très-dangereuse: car comme il va du côté gauche du cou au côté droit, et par conséquent d'une manière tout-à-fait transversale devant l'artère aspera, elle pourroit exposer au plus grand péril celui auquel on feroit l'opération de la bronchotomie." He then adds that "a distinguished professor being engaged in performing the operation mentioned (bronchotomy) on the child of another equally distinguished professor," the patient died in his hands, without the operator being able to assign any cause for the unfortunate result; and he implies that the artery must have been wounded. There is little doubt, however, that if this had occurred, the surgeon would not have had any doubt as to the cause of death.—Nouv. Mém. de l'Acad. des Sciences, Berlin, 1785.

Bourgery gives in his large work a plate showing some of the variations of the branches of the arch of the aorta, and he states that they have been borrowed (empruntées) from Tiedemann. It is necessary to remark that all the arteries have been altered in shape, and that the trachea has been added in a great number, though not represented in the work from which they are said to be taken; and the direction given to the carotid, and especially the subclavian artery, with respect to the air-tube, is in many cases incorrect. Traité de l'Anatomie de l'Homme, &c., tome 4, pl. 33.

now nearly a thousand in number—four cases have been found; giving a proportion of 1 in about 250.

The passage of the artery between the trachea and the œsophagus is of extremely rare occurrence. It is often mentioned in treatises of anatomy—generally, however, without reference to particular cases. Meckel describes one *, and others are assigned to the observation of Dr. Monro † and Zagorsky ‡. But on examining the dissertation of the former §, and the essay of the latter ||, it does not in either case appear clearly from the written description, or the figure, what the position of the vessel was with regard to the œsophagus. The most remarkable example of this rare course of the artery is that described by Dr. Bayford ¶, from one of whose drawings figure 7, in plate 20, has been taken. This case is especially worthy of notice, because the person in whose body the peculiar disposition of the vessel was found, had been affected, during a long series of years, with symptoms which probably resulted from the contact of the artery with the œsophagus.

A female was from the earliest age occasionally subject to difficulty of swallowing: her sufferings were increased at the period of puberty, and afterwards became periodically—once or twice a month—so much aggravated as to require the loss of blood; the abstraction of which always afforded relief. The menstrual function was habitually defective. During the course of a life, extended to about sixty-two years, this most distressing complaint was liable to increase on taking exercise, or under the influence of any cause tending to accelerate the circulation. The pain and the seat of the obstruction were referred by the patient to the upper part of the sternum. "As her complaints," says Dr. Bayford, "were continually aggravated rather than diminished by time, she became at length

* "Dem normalen näher ist der Weg zwischen der Luft und Speiseröhre, welchen diese Arterie bisweile nimmt. Dies fand in dem dritten der von mir beobachteten Fälle ** Statt," &c.—Handbuch der pathol. Anatomie, Band 2, S. 100.

† By Allan Burns—op. cit. and by others.

‡ By Otto—in "A Compendium of Human and Comparative Pathological Anatomy"—translated, with additional notes, &c., by J. F. South, London, 1831.

§ De Dysphagia.—Edinb. 1797.

|| "Mém. de l'Acad. Imp. des Sciences de St. Petersbourg"—tom. 2, p. 318. —1810.

¶ "Memoirs of the Medical Society of London"—vol. 2, p. 275.—1793.

unable to struggle; and being worn out by fatigue and famine (for it is asserted that she scarcely swallowed a single morsel for the last three weeks of her life), she sank into her grave."

On examination of the body after death, nothing was detected, to which the difficulty of deglutition could be assigned, except the position of the artery between the trachea and œsophagus. From the obvious connexion between the state of the circulation and the symptoms, it was reasonably concluded that the vessel was the source of these; and, under the guidance of an opinion then generally entertained, that deviations from the usual arrangement or position of organs were so many "lusus naturæ," Dr. Bayford gave the name "dysphagia lusoria" to a disease which he was the first to describe. As there is not, so far as I have been able to learn, any case on record in which an exactly similar state of the vessels was ascertained to exist, with or without symptoms of a like kind, it cannot be said that the inference drawn from that now detailed has been confirmed, or the contrary. It is, I believe, at present an isolated observation.

The other cases, in which the existence of a subclavian artery, directed transversely from the left side of the aorta, has been associated with an account of the state of deglutition, differ from that above referred to in the important circumstance that the artery was found in each behind the œsophagus, not between that tube and the trachea; and they for the most part happily go to prove that the vessel may be so placed without exercising any injurious influence. Two cases, which appeared to the authors to have the opposite tendency, are reported in a very elaborate and lengthened paper by Autenrieth and Pfleiderer*. Of one of these—the only one which appears to bear pointedly on the subject—a few particulars may be stated.

On the examination of the body of a female who died at an advanced age, the right subclavian artery was found to arise from the left side of the arch of the aorta, and to cross behind the œsophagus to its usual position on the first rib. It was

* Dissertatio inauguralis. De dysphagia lusoria, 1806, in Reil, and Autenrieth's "Archi. für die Physiologie," Band 7. 1807.

ascertained that the person had been, for some time before death, subject to pain in the stomach and difficult deglutition; and those symptoms were augmented towards the close of life to such an extent that she refused to take any food except fluids, declaring her inability to swallow.—The symptoms do not appear, from the report of this case, to have been so continuous and urgent during the whole of life, as they would probably have been if produced by the position of the artery; and the details are insufficient to prove that the difficulty of deglutition was not attributable to some other cause.

Finally, it should be stated, that while the general absence of allusion to impediment of deglutition in those persons in whose bodies the unusual artery was discovered, may be taken as presumptive evidence that it had not existed, some observations, carefully made, afford positive testimony to the same effect. One example may be shortly cited.

The subclavian artery was found in the unusual position between the œsophagus and the spinal column, in the body of a young man. Professor Otto, who gives the history of the case *, states that he had observed the person closely for a considerable time previously to his death, and that there was not the slightest difficulty in swallowing.

C. *Peculiarities in the origin and course of the left subclavian artery.*—This artery is not unfrequently altered in position—together with the other large branches—towards the right side of the arch; and when the situation of its origin is thus changed, the direction of the vessel is necessarily more oblique than usual towards the point of emergence from the thorax.

It has little tendency to combine, or arise in common with the other branches of the aorta; there are, however, a few, and only a few, examples of its junction with the left carotid. —Ante page 46, and plate 6, figs. 8 and 9.

The statement as to the infrequency with which this subclavian artery joins the carotid does not apply to the cases

* "Das Subject war ein Schifferknecht von etlichen 20 Jahren. * * * Da ich ihn hier mehrere Monate zu beobachten und zu behandeln Gelegenheit hatte, und ihn oft trinken und essen gesehen hatte, ohne dass die geringsten Beschwerden beim Schlucken entstanden waren, so ist dieser Fall ein neuer Beweis, dass die so genannte dysphagia lusoria nicht immer Folge dieser Arterien varietat ist, &c."—Seltene Beobachtungen, Th. 1, S. 100.

in which the aorta arches to the right instead of the left side, for in them the innominate—if it exists—is as usual the first branch, but the position being changed with that of the aorta, it divides into the left carotid and subclavian, as is seen in plate 5, figures 3, 4, and 5.

It is interesting to observe that when the aorta has the direction last referred to—namely, when it turns over the right instead of the left bronchus—a subclavian artery may be found to arise from the descending part of the arch and take, to a certain extent, the course across the vertebral column, which has been described in the preceding pages; but here the vessel has the opposite direction—from the right to the left side—and is the left in place of the right subclavian artery.

One case in which this disposition appears to have existed without any other remarkable peculiarity, is mentioned by Otto *. Descriptions and delineations have been separately and independently published by Fiorati and Sandifort of a preparation—previously referred to, as showing peculiarities of the arch of the aorta and its branches †— in which the left subclavian had apparently the origin and course above pointed out, but in reality the artery was derived from a conical dilatation. This peculiar structure was connected by its base to the aorta, and narrowing at the other end, at the same time gave origin to the subclavian artery, and received the attachment of the ligamentum arteriosum. On examination of a case lately described by Mr. Ewen ‡, I have found that it corresponds with the preceding, both as to the existence of the dilatation and the arrangement of the vessels. See plate 20,

* "Die Arterienäste, welche aus dem Aortenbogen entsprangen, waren, von links nach rechts gezählt, folgende. 1. die A. carotis sinistra; 2. die carot. dextra; 3. die art. vertebralis dextra; 4. die subclavia dextra, und; 5., ganzen hinten, nach dem Rückgrathe zu, und viel weiter unten und fast schon aus der Aorta descendens, die subclavia sinistra; welche zwischen der Wirbelsaule und dem Schlunde zum linken Arme hinüber lief."—Seltene Beobacht. Th. 2. S. 61.

It is to be regretted that the paper contains no account of the pulmonary artery, or of the ligamentum arteriosum.

† Ante pages 18 and 47, and Plate 7, figs. 1 and 1*b*.

‡ Case of transposition of the aorta, trachea, and œsophagus; tuberculated liver, &c., with a plate.—Guy's Hospital Reports, vol. 5, p. 283. In Mr. Ewen's description of the preparation is contained the following reference to the left subclavian and pulmonary arteries:—"The impervious canalis arteriosus passed from the root of the left subclavian, before the lower end of the trachea and commencement of the left bronchus, to reach the pulmonary artery."

figs. 8 and 9, and compare these with figs. 1 and 1*b*, of plate 7. The foregoing are not the only examples of the vessels given from the aorta having dilatations connected with their origin. Hommel mentions one found in connexion with the subclavian artery of the right side, and another is described by Walter at the origin of the vessel of the left side. A case similar to that described and delineated by the last-named observer, is represented in figs. 2 and 2*b*, plate 6, from a preparation in my collection. In these three instances the arch of the aorta had its accustomed course to the left side.

With respect to the nature of the enlargement or dilatation existing in these different cases, the observers referred to scarcely offer a conjecture, and I have not succeeded in obtaining any information on the subject from works of anatomy. The remarks made concerning it in the papers quoted, are confined to the description of the appearance and connexions, without allusion to the manner of its production. Thus, Sandifort * speaks of it as a purse or protuberance into which the aorta was expanded below its arch. Fiorati mentions it nearly in the same way. Hommel † states, of his case, that the artery arose by a large orifice as if from a kind of sac. Walter ‡ alone gives an opinion as to its nature, describing it as an aneurism.

In order to explain the conclusion I have arrived at, as to the nature of the pouch—for such it may be named for sake of convenience—it will be necessary to give a statement of the facts which have led to the conclusion. These may be

* "Quod vero attentionem maxime ad se convertit, bursa fuit seu protuberantia conoidea ferme, in quam truncus ipse aortæ descendeutis statim infra arcum sese explicabat, quæ protuberantia, a dextris ad sinistras procedens, sensim contrahebatur ut in truncum sinistræ subclaviæ desineret. Iuter apicem hujus conoideæ protuberantiæ et radicem subclaviæ quæ ex ipso surgebat, inserebatur canalis arteriosus, jam ligamentum factus, &c.' —Mus. Anatom. tom. 1, p. 273.

† "Alterum cxemplum, quod laudatus D. auctor observavit, monstrat arcum aortæ, ex quo ambæ carotides ex communi ductu brevissimo ad latus dextrum exsurgunt; subclavia vero utraque peculiari trunco oritur ita quidem, ut sinistra in medio sit, dextra autem in sinistro latere amplo orificio, quasi ex sacco quodam, proveniat."—Commerc. Lit. Norric. t. 2, p. 318.

‡ "En tant donc qu'on rencontre ici quatre artères, c'est une observation rare; mais si nous faisons attention à la manière dont l'artère souclavière gauche, dès son origine de l'arc de l'aorte, a formé un grand sac qui l'a rendu anevrismatique, alors cette observation offre uu cas également rare et dangereux. Ce n'est pas un simple jeu de la nature; c'est la cause d'une des maladies du cœur."—Nouv. Mém. de l'Acad. Royale des Sciences, &c., p. 16, § 14, Berlin 1785.

arranged into two sets: according to the position which the pulmonary artery and the ligamentum arteriosum or canalis arteriosus bear with reference to the arch of the aorta.

a. The vessels having their usual course and position: a small nipple-shaped dilatation is not unfrequently observable on the concave side of the arch towards the left side, projecting at the point at which the ligamentum arteriosum is united to the aorta. The connexion of this dilatation, with the ligament just named, suggests that it is an unobliterated part of the canalis arteriosus. But the dilatation from which the subclavian artery has been found to arise, is of considerably larger size than those now noticed, (see plate 7, fig. 2 *b*). In accounting for this fact it will be assumed for the present that the subclavian artery may arise from the canalis arteriosus near its end. Now, supposing this to be the case, it is manifest that, blood being transmitted from the aorta into the subclavian artery through the end of the canalis arteriosus, the obliteration of the upper part of this tube must, as a necessary consequence, be prevented. The greater size of the pouch in this case is, then, according to the view here taken of the subject, owing to the origin of the large artery from it.

It may here be added that should the aorta be directed to the right side, the change of its course being accompanied by the general transposition of the viscera, the pulmonary artery undergoes a corresponding alteration of its position; it is placed on the right side, and the ligamentum arteriosum joins the concavity of the arch in the usual way, (plate 5, figure 4). And, moreover, when the aorta has the unusual direction at the same time that the viscera retain their ordinary position, the course of the pulmonary artery and the ligamentum arteriosum, or canalis arteriosus, may be—but, as will presently appear, is not always—the same as that just indicated. This fact is illustrated in the body of a fœtus described by Mr. Abernethy, and noticed in a former part of this work, page 18, and plate 5, fig. 5*. From the circumstances before stated, it

* Having by the favour of Mr. Stanley and Mr. Paget, made a careful examination of this preparation in the museum of St. Bartholomew's Hospital, I found the pulmonary artery on the right side of the aorta, and the canalis arteriosus joining the descending part of the arch, as occurs when the vessels have their accustomed course.

is apparent that, as the canalis arteriosus joins the arch of the aorta in the ordinary way in these various cases, a dilatation, if any existed, would probably be the same as those already described.

b. A very different disposition from the preceding exists in the two preparations, represented in plate 7, fig. 1, and plate 20, figs. 8 and 9 : for while the aorta arches to the right side, the pulmonary artery retains its usual position on the left, and the ligamentum arteriosum joins a pouch projecting from the aorta. Now, an inspection of the figure (8) will show that the canalis arteriosus, in order to join the aorta at the end of its arch, must, in such a case as this, necessarily pursue a circuitous course, and cross the trachea and œsophagus. If it had the transverse course behind these tubes, if also the subclavian artery arose from it, the appearance of the vessels would be easily explained, for the pouch would be in these, as in the former instances, the end of the arterial canal, unobliterated, because of the transmission of blood through it from the aorta.

In order to complete the view here presented of the nature of the dilatations or pouches under discussion, it is necessary to show the left subclavian artery arising from the canalis arteriosus in the fœtal state before any part of this canal has been changed into a ligament. Cases in which the subclavian artery and the "arterial canal" had this disposition are recorded by Klinkosch *, and Meckel†, and two figures contained in the essay of the former are copied in plate 20, figs. 10 and 11. In one of the figures the heart and large vessels are viewed

* After mentioning the course of the aorta to the right side, the author continues : —" Ductus arteriosus, ut altera aortæ radix, flexione obtusa facta et oblique deorsum et dextrorsum descendens, cum columna posteriore arcus aortæ æque oblique posita, in distantia quatuor circiter linearum sub origine arteriæ subclaviæ dextræ, confluxit in regione quintæ vertebræ dorsi in unam aortam descendentem, insulamque cum arcu aortæ effecit, quæ et arteriam asperam et œsophagum transmisit. Ductus nunc arteriosus, truncum arteriæ pulmonalis inter et aortum communicans in ⅓ longitudinis suæ distantia ab aorta, emisit arteriam subclaviam sinistram. Quæ oblique antrorsum se conferens solitos dedit ramos. Hinc arteria subclavia sinistra soboles erat canalis arteriosi et non aortæ," &c. " Anatome partus capite monstroso" in the "Dissert. medicæ selectiores Pragenses," vol. i. p. 201. Pragæ et Dresdæ, 1775.

† "Bisweilen aber ist auch die linke Schlüsselpulsader ein Product der rechten Aorta. So entsprang sie in dem einen der von mir angeführten Fälle nicht aus der Aorta, sondern aus dem arteriösen Gange," &c. " Handbuch der Pathol. Anat." B. 2, S. 105.

from before: in the other, the parts are seen on their posterior aspect. The aorta and pulmonary artery have, as they arise from the base of the heart, their ordinary relative position (see fig. 10): the former is directed to the right, and the latter to the left side of the trachea and œsophagus. On an inspection of the eleventh figure — the vessels being viewed from behind — the canalis arteriosus (14) is seen to have a transverse course behind the œsophagus and the trachea (*d* and *b*), and to join the aorta; and the left subclavian artery (5[1]) is derived from it at some distance from the aorta.

In conclusion: supposing the case last mentioned to undergo the usual changes which occur after birth, a doubt cannot be entertained that it would be brought into the exact condition of those referred to immediately before; for the canalis arteriosus would be partly reduced to the state of a cord or ligament, but this alteration would not extend beyond the point at which the subclavian artery takes its origin; and the remainder, transmitting blood from the aorta into the artery just named, and being larger than the vessel given from it, would constitute a pouch.

Before parting from the cases which have been last under observation, the position of the trachea and the œsophagus with respect to the arteries, requires notice. They are seen in plate 20, figures 10 and 11, to be surrounded by the blood-vessels; for, the aorta is in front of them and at the right side, the pulmonary artery on the left, and behind is placed the canalis arteriosus. And in the modification of this condition which exists in the adult, the arrangement is the same, except that a portion of the "canalis" has become impervious—see the figures immediately preceding those last referred to. This position of the air-tube and œsophagus recalls to mind a case described in a former part of this work, in which they passed through a division of the aorta*.

* Page 22 and plate 5, figure 8. Since the reference to this case was written, I have met with the account of another similar to it nearly in all respects. It was found in the body of an adult male. The aorta divided, and the parts after embracing the trachea again speedily united; but the œsophagus is not mentioned as being placed in the sort of ring formed by the vessel, and it is to be inferred from the statement of the observer that the œsophagus was not so placed; for, the divisions of the aorta are

Connexion of the "Canalis arteriosus" with the left subclavian artery. In the foregoing observations the left subclavian artery has been seen to take rise from the canalis arteriosus; another class of cases showing a different connexion between these vessels will now be shortly adverted to. In these cases the "arterial canal" unites with the left subclavian, and has no connexion with the aorta. A figure which, in so far as the arteries are concerned, may serve as a type of this arrangement, has been copied from an essay by Bernhard, see plate 7, fig. 3. The body was that of an infant, who died immediately after birth,—this having occurred at the usual period. The aorta arches to the right side, and to the left of it lies the pulmonary artery in the ordinary position. The right pulmonary artery is directed transversely as usual, and, in addition to its ordinary connexions, crosses in front of the descending aorta: and the artery of the left side enters immediately into the lung. The canalis arteriosus, still unobliterated, having its accustomed origin from the beginning of the left pulmonary artery, joins the left subclavian immediately beyond the innominate, which in this case is on the left side.

Cases are recorded by Reinmann *, Obet †, Cail-

said to have been fitted to the trachea, the anterior division of the vessel being adapted to the rounded shape of the front and sides of the air-tube, and the posterior to its flattened back part. After describing the arrangement of the aorta, the author continues, "Et, quod magis mirum est, per hiatum illum præter naturam formatum, pars inferior tracheæ migrahat, eoque superato, in bronchia sueto ordine dividebatur. Forma hiatus hujus, qui tracheam arcte amplectebatur undique, erat irregularis, et ipsius tracheæ formæ perfecte accommodabatur, sic, ut margine, posticitus recto, responderet planitiei partis posterioris musculoso-membranaceæ, anticitus vero et lateraliter margine excavato adaptaretur convexitati externæ segmentorum cartilagineorum fistulæ spiratilis." Zagorsky, loc. citat. tome 9, p. 387. The detail of this case would have been more satisfactory if the situation of the œsophagus had been stated.

* "In cadavere mendici cujusdam, catarrho suffocativo in via extincti et pro instituenda publica sectione in theatrum anatomicum delati, deprehendi canalem arteriosum ab arteria pulmonali sursum ascendisse, atque arteriæ subclaviæ sinistræ fuisse insertum, quam plane singularem structuram et connexionem, nondum hactenus ullibi notatam animadvertere mihi licuit." Nova Acta Phys. Med. Acad. Cæsar. Leopold. et Carol. Naturæ Curiosorum exhibentia Ephemerides—tom. 1, observat. 74—Norimbergæ, 1757.

† "Le sujet de cette observation est né a Brest, le 31, Decer. 1800, et est mort le 10 Décr. 1813.

L'Artère pulmonaire dont le calibre étoit trop petit pour permettre l'introduction d'une sonde à poitrine, et dont les parois étoient très minces, naissoit de la partie supérieure du ventricule droit, un peu en avant de la cloison qui ordinairement sépare les deux ventricules" (the septum is stated at another place to have been defective at the upper part of the ventricle); "elle se bifurquoit comme dans l'état naturel et fournissoit, avant sa division, le canal artériel, dont le calibre étoit assez petit, mais qui n'étoit cependant pas oblitéré; ce canal alloit s'ouvrir à l'origine de l'artère

liot *, Jackson †, and others, in which the canalis arteriosus and the left subclavian are described as being connected in the manner here stated. It should be observed that the accounts of the cases are generally defective as far as regards the course of the aorta; but it is to be inferred from the direction of the innominate artery to the left side in some of them, that, in these at least, the aorta arched to the right side, as in the example recorded by Bernhard.

It is an important feature of these cases that the curious disposition of the vessels was found to be accompanied with malformation of the heart—the right and left cavities communicating one with the other; such, at least, was found to be the fact in the instances in which that organ was examined.

Although it will not be strictly in place under the head of the left subclavian artery, allusion may here be made to a case in which there existed two arterial canals, or branches of communication between the pulmonary and the systemic arteries.

sousclavière gauche. * * La crosse de l'aorte étoit d'un volume un peu plus qu'ordinaire; mais le départ des troncs principaux qui constituent l'aorte ascendante offroit des particularités très remarquables: la carotide et la sousclavière gauche en partoient les premières et naissoient d'un tronc commun, et c'est à la naissance de cette dernière, placée la plus gauche, que venoit aboutir le canal artériel," &c. &c.

The child had been for some time after birth in good health; in a couple of months it became affected with difficulty of breathing; and, towards the close of life, the skin, which up to that period was natural in its colour, assumed a dark or bronze hue.—"Bulletin des Sciences Médicales, publié par la Société Médicale d'Emulation de Paris"—tom. 2, p. 65.—Paris, 1809.

* "L'orifice de l'artère pulmonaire très-étroit, ne presentait que deux valvules sigmöides. Cette artère, plus rétrécie encore au-dessus de son origine, augmentait ensuite de diamètre en s'éloignant du cœur, &c. * * Le canal artériel complètement oblitéré, se rendait dans la sousclavière gauche: celle-ci donnait naissance à la carotide du même côté, tandisque la sous-clavière et la carotide droites naissaient par deux troncs séparés."

Two cases are detailed by the same physician. In both, the arrangement of the vessels was probably the same; and the right and left cavities of the heart communicated,—the partitions both of the auricles and the ventricles being incomplete. One of the children, that whose case is detailed, was eleven years of age: the other three years.

Bulletin de la Faculté de Méd. de Paris—tome 1—1812.

† Case of a female child who died at the age of three years. Respiration had been habitually hurried, especially on taking exercise, but the skin had always the natural appearance. After stating that the septum of the auricles and that of the ventricles were defective, the reporter continues:—"The great arteries were considerably different from what is common. The pulmonary artery was by much the largest and most prominent. It formed a small arch, which made it appear like the aorta. It divided into two branches immediately as it began to descend after having made its curvature. Of these branches that to the left side was the largest. They went to the lungs as usual; but from the left branch went off a small vessel to the left subclavian." "Case of inflammation of the mucous membrane of the alimentary canal, and of malformation of the heart," in the "London Med. and Phys. Journal," vol. 34—1815.

One joined the aorta in the usual way; the other arose from the right pulmonary artery close to the lung, and terminated in the innominate very near the origin of the right subclavian. The latter was much longer and more slender than the former *.

D. *The position of the origin of the branches, generally.*—The situation in which the branches arise from any large artery is an important consideration in its history, because of the influence which their presence has on the result of an operation for the cure of aneurism. And,—considering the shortness of the trunk, the size of the offsets, and the manner of their arrangement on the parent vessel,—it may be confidently stated that there is no artery in which the influence alluded to is more considerable than in the subclavian.

Each subclavian artery is almost universally considered to be divisible into three parts, marked by the anterior scalenus muscle—the first part being to the inner side of the muscle: the second beneath it: and the third, the portion extending from the scalenus to the outer margin of the first rib. The circumstances of the vessel are so different in these three situations, in respect to the connexions and the branches given in each of them, that the division is a very convenient one, and it will be followed here.

The branches which arise from the first part of the subclavian arteries are usually the vertebral, the internal mammary, and the thyroid axis—the last-named being a trunk common to the inferior thyroid, the supra-scapular, and transverse cervical branches. To these three branches must be added, for the left side, the superior intercostal, which on that side takes its rise somewhat more frequently to the internally to the scalenus muscle than beneath it. The instances of a departure from this arrangement, of material or practical importance, are not numerous; those most worthy of notice are cases of rare occurrence, in which several of the branches are transferred from the first to the second or the third division of the artery; they will be again referred to. The position which the

* Case of a malformed male infant aged six weeks, in a paper by Breschet, contained in the "Repert. générale d'Anatomie et de Physiologie pathologiques, &c." —Tome 2, p. 10.—Paris, 1826.

branches occupy on the first part of the arteries requires separate consideration on each side.

The left subclavian being nearly vertical in direction from the arch of the aorta to the scalenus muscle, only a small part can be said to be placed to the inner side of the scalenus after its emergence from the thorax; and the entire of the artery from the aorta to the muscle is so deeply placed, and, at the same time, covered by such important parts, which do not admit of being moved aside—namely, the pleura and the lung with the internal jugular and innominate veins—that no operation has been hitherto undertaken on this division of the vessel; and indeed an effort to expose it in a surgical operation does not seem admissible. It is, therefore, unnecessary to comment on the position of the branches in this place, further than to say that they generally are given off close to the scalenus muscle, and that they are at their origin covered by the internal jugular vein — see plates 1 and 2.

The distance from the commencement of the right subclavian artery to the origin of the branches is of importance in a surgical point of view, because it may be desired to place a ligature on the first part of this artery for the cure of aneurism. To determine this point,—to ascertain the distance in several cases,—observations were made on sixty-five bodies (see the table); and they were distributed as follows:—

Length of the right subclavian artery from its origin to the point at which branches arise

½ inch and under	8
more than ½ inch, and not exceeding 1 inch . . .	33
more than 1 inch, and not exceeding 1½ inch . .	23
1¾ inch (the extreme length)	1

Cases have occasionally come under my observation in which one of the branches, instead of arising with the others near the scalenus muscle, was found to be given very close to the innominate artery. The branches found to occupy this unusual position were the vertebral and the inferior thyroid — see plate 21, figs. 9 and 10.

I have sometimes seen the branches given off at regular

intervals—one being close to the beginning, another at the middle, and a third at the end of the first division of the main artery. A still greater departure than this from the ordinary arrangement and position of the vessels is that rare condition represented in the fifth figure of the twenty-first plate, in which the branches are seen to be more numerous than usual, and to be diffused over the main artery in such a way that a ligature, placed at any point, must have been close to or in contact with a branch.

The branches derived from the second division of the subclavian arteries. From the observations which have been made—see the table, page 113, et seq., and the abstract of it, page 130—it appears that in two-thirds of the cases noted, one branch took its rise in this situation, and that in more than half the remainder the artery furnished no offset. Two branches occurred in the proportion of 1 in $8\frac{1}{3}$ cases, and three branches in the proportion of 1 in 66. In a single instance the greater number of the branches of the subclavian arose in this part of the artery—viz., the internal mammary, the scapular, and the superior intercostal—see plate 21, fig. 6. A difference was noticed between the vessels of opposite sides, the entire absence of branches having been found more frequently on the left side, and the presence of one branch more frequently on the right side.

The branches derived from the third division of the subclavian arteries. In the table and abstract already referred to, it is seen that in somewhat more than half of all the cases noted this division of the arteries was without any offset—the proportion is 1 in $1\frac{6}{7}$;—and that in less than half,—one example occurring in $2\frac{1}{6}$—it gave origin to a single branch. Two branches were occasionally observed—the proportion of the variation being 1 in $37\frac{1}{2}$—and three occurred in two instances out of 263. I have lately seen another instance * of the variation last alluded to, and one in which four branches arose between the scalenus muscle and the outer part of the first rib—see plate 21, figs. 7, 8, and 10, and plate 24, fig. 4.

* This was met with by Mr. R. Quain, M.B., while performing surgical operations on the dead body.

E. *Peculiarities of the branches individually.* The observations made on the arteries in this work having chiefly reference to such points as bear on the operations of surgery, the notice of these branches will, as in other cases, be brief, and will not include any part of history of small ramifications.

THE VERTEBRAL ARTERY.

The origin of this artery was noted in 290 cases. It was not found in any instance to be placed beneath or beyond the scalenus; and there is not, that I am acquainted with, any example on record of its being so situated.

The artery of the right side has not been seen either in any of the cases noted in the table, or in any of the bodies which have come under my observation, to deviate from the ordinary place of origin, further than by being given from the subclavian artery nearer than usual to the commencement of this vessel. Seven examples of deviation to this extent are recorded in the table, and I have observed a much greater number; it is exemplified in plate 21, figures 5 and 10. Several instances have been described by anatomists of the right vertebral being derived from the common carotid; and in all the cases of this variety that I have observed in museums, or read of, the subclavian was given as a branch of the aorta—see plate 5, figure 8, and plate 6, figure 13. It is remarkable that in a majority of the specimens showing the subclavian artery to arise from the left side of the aorta, which are contained in one valuable collection *, the vertebral is a branch of the carotid; and that this did not once occur in the cases which fell under my immediate observation. The right vertebral artery has in a few cases been found to arise directly from the aorta: see ante, page 53, where two examples are cited; and to these may be added one in which the unusual origin of the vertebral artery accompanied transposition of the arch of the aorta, see ante, p. 52.

The usual place of origin of the left vertebral is the angle formed by the subclavian, as this artery inclines outwards in

* The Macartney collection in the Anatomical Museum of the University of Cambridge.

the neck from the thorax. From that point the vertebral ascends vertically, so that it may be said to continue the vertical direction of the thoracic part of the subclavian. Not unfrequently the artery of this side is derived from the arch of the aorta. In these cases it is usually placed between the carotid and subclavian of the left side; but there are a few examples of the vessel having been found to take origin from the arch beyond or to the left of all the branches: they are referred to in a previous part of this work—page 51. Between the points of origin stated—namely, that from the subclavian and that from the aorta—there are several intermediate stages at which the artery under observation occasionally arises; so that on the examination of a large number of cases, there would be found an easy transition between the extremes. Figures 2, 3, and 4, in plate 22,—drawn from preparations in my possession—have been introduced to illustrate this fact.

The vertebral arteries have been found in a few instances to result from the union of two or even of three branches, or rather roots: and each of these is given off, for the most part, in the situations in which the artery when single is, in different cases, seen to take origin. Thus, both may spring from the subclavian, as shown in plate 22, figure 9; or one from that vessel and the other from the aorta, as in figures 7 and 8 in the same plate. All the examples that I am acquainted with, in which this artery has more than a single origin, occurred on the left side, with the exception of one, and in it there were three distinct roots—two being derived from the subclavian, and one from the thyroid artery —see plate 24, figure 2. The place of union of the smaller vessels into a single artery varies; being in one case before either had entered the canal in the vertebræ: in others, after one vessel had passed through a single vertebra, or through the foramina of two of these bones. The figures already mentioned contain illustrations of these facts.

To explain the manner of the production of the various conditions of the vertebral arteries noticed in the latter part of the preceding observations, it may be supposed that in an early stage of development a great number of blood-canals

exists, and that the continuance of one of these, varying in its position in different cases, while all the others are removed, will account for the existence of a single branch, and the variations which occur in its position. Further, the persistence of two or three of the original canals would explain the double or threefold origin found in some cases. The preparation represented in plate 22, figure 10, may be mentioned in corroboration of this view; in it there are three branches—each occupying a position in which the single vertebral artery is occasionally found. It is obvious that the increase in size of either of the two upper branches, which are here in a rudimentary state, would—the others being removed—constitute one of the conditions of the vertebral artery represented in figures 1 and 2; and that a modification of the size, and the junction of two of them, would give rise to the double origin shown in the other figures.

The vertebral arteries of opposite sides often differ in size. An example of this difference to an unusual extent is given in the first figure of the plate above referred to.

They usually enter the canal in the spinal column at the sixth vertebra; but one is not unfrequently found to rise higher before perforating a transverse process. No example has occurred under my observation of the vessel entering in the first instance a vertebra higher than the third; there are, however, some mentioned by anatomists, in which the second or the first vertebra was that which first received the artery.

Branches.—The branches given from the vertebral arteries are chiefly distributed to the spinal cord and the encephalon, and will be shown in a future part of this work. Independently of these and of some small offsets to the muscles of the neck, —shown in plate 18, fig. 2—the vertebral has been occasionally found to give origin to some of the branches which are usually furnished by the subclavian. In one instance I found the inferior thyroid artery, and in two cases the superior intercostal, to take origin from it — see plate 22, figs. 5 and 6.

THE THYROID AXIS.

The Origin.—The thyriod axis was found to take origin from the subclavian, internally to the scalenus muscle, in 271 of the cases noted in the table. In two it arose beyond the muscle, and both occurred on the left side. The artery was in several cases so connected to other vessels at its origin, that it might be said to give rise to them. In fifteen instances it gave origin to the internal mammary ; and the vertebral, the superior intercostal and the " profunda cervicis," were found to be derived from the thyroid,—each in a single instance.

Branches.—The usual branches of the thyroid axis are the inferior thyroid, the supra-scapular, and the transverse cervical. The branches deviate from this arrangement and from their usual distribution so frequently that they require to be separately commented on.

THE INFERIOR THYROID ARTERY.

This artery arose as an independent branch in twenty-nine of the cases recorded in the table. In one of these it arose from the common carotid—plate 12, fig. 4 ; in another, from the vertebral—plate 22, fig, 6; and in the remainder it was derived from the subclavian, in the manner illustrated in plate 21, figs. 5, 6, and 9. Two other examples of the inferior thyroid being given from the common carotid, are delineated in plate 23, fig. 10, and plate 24, fig. 1. The inferior thyroid is often mentioned in my notes as being smaller in size than usual, and in six cases it was altogether wanting—see plate 23, figures 3, 7, and 8. The manner in which the absence is compensated for in various cases will be shown in the next paragraph. On the other hand, instead of a single inferior thyroid artery, two of these vessels are occasionally found to exist, as exemplified in the eleventh figure of the same plate ; in this case, one of the branches has the usual position with reference to the common carotid artery: the other crosses in front of that vessel. This is a rare variety.

The superior and the inferior thyroid arteries are so intimately associated in their distribution, and they are so

often found to take the place, one of the other, that it is necessary to review them in connexion. Some other branches which assist these vessels, or supply their places in certain cases, will at the same time be noticed.

THE SUPERIOR AND INFERIOR THYROID ARTERIES.

The arteries distributed to the thyroid body are usually four in number—on each side, two—one being superior, the other inferior. The former is derived from the external carotid, and ramifies on the anterior surface of the thyroid body; the latter takes origin, as shown above, from the thyroid axis, and supplies the posterior surface of the same structure.

The number of these arteries is not unfrequently altered; it may be diminished to three or two, or increased to five or more. The diminution of the number to two may arise from the absence of the two arteries from above, or of those from below. In such cases the defect is supplied by the vessels present, which are then of increased size. Thus in the second figure of the twenty-third plate, both the superior arteries may be said to be wanting, and their place is taken on the anterior surface of the thyroid body, by branches from the inferior arteries. In the following figure of the same plate the contrary occurs, for the usual branch is not given from the subclavian; and instead of it, one from the superior thyroid sinks to the posterior surface of the thyroid body. If one of these sources of diminution of the number should be present on one side, at the same time that the usual disposition of the vessels exists on the other side, the number of thyroid arteries would obviously be three. Other arrangements of the thyroid arteries producing modifications of their number will be found in the twenty-third plate.

The thyroid body sometimes receives an artery from a different source, *e. g.* the innominate, the common carotid, subclavian (a second branch), or the aorta. The thyroid branches derived from these arteries are rarely met with, except that from the innominate, and this alone requires description here, the others having been already sufficiently referred to—ante, pages 52 and 170.

The thyroid branch of the innominate artery is chiefly important from the position it has with respect to the trachea, and the consequent bearing on the operation of tracheotomy. It was named the "lowest thyroid artery," (arteria thyroidea ima) by Neubauer and Erdmann*, who have given a very accurate and elaborate description of it, in an essay quoted in other parts of this work.

This artery is, in some cases, a fifth or an additional branch of supply to the thyroid body; in others it is found to take the place of one or more of the ordinary branches. Thus, in figure 7 of the plate referred to, it is distributed in place of the left inferior thyroid artery: in figure 8, in place of the right inferior: in figure 9, it compensates at the same time for the defect of the two superior, and of the left inferior branches. And the tenth figure affords an example of five arteries distributed to the thyroid body—the branch of the innominate being the fifth or additional branch.

The size of the lowest thyroid artery varies very much. In reference to this point, it may be said that the artery is generally of moderate dimensions—not unfrequently very slender—and occasionally of considerable thickness.—See figs. 7, 8, 10, and 9, of plate 23.

THE LARYNGEAL BRANCH OF THE SUPERIOR THYROID ARTERY.

In the observations on this artery contained in page 106, some facts were reserved for this place, in order that they should more nearly accompany the illustrations in plate 23. The laryngeal artery is sometimes seen to perforate the

* "At ab iuterno, seu sinistro arteriæ anonymæ latere, ejusque parte media vel paullulum superiore, ramus interdum provenit, qui super asperam arteriam sursum proserpens, pluribus ramulis suis inferiori glandulæ thyroideæ parti prospicit. *Arteriam thyroideam imam* illum denominabo."

The authors of this paper give also descriptions of the thyroid branch which occasionally arises from the lower part of the common carotid, and of that so rarely derived from the arch of the aorta; and they apply to them the same name, distinguishing each by the addition of the name of the trunk from which it emanates. Thus, three chapters containing an account of the arteries are headed as follows:—

"§ vi. De art. thyr. ima, rariore arteriæ innominatæ ramo."—"§ vii. Art. thyr. ima, ex carotidum trunco dextro nata."—"§ viii. Art. thyr. ima, ex. arcu aortæ producta."

"Descript. Anatom. Arteriæ innominatæ et thyroideæ imæ.—Cum tab. æneis. Jenæ 1772."

thyroid cartilage, instead of passing inwards through the thyro-hyoid membrane; and I have found it to pass to the interior of the larynx below that cartilage, immediately to the outer side of the crico-thyroid membrane—see plate 23, figures 4 and 5. A laryngeal artery of unusually large size has in one case—plate 23, figure 6—been seen to course downward on the inner side of the thyroid cartilage, and to end in the thyroid body after having escaped from within, by the side of the crico-thyroid membrane.

SUPRA-SCAPULAR ARTERY.

Among the cases recorded in the table, *the origin* of the supra-scapular artery was placed

Internally to the anterior scalenus muscle in	169
under the muscle in	3
beyond it in	14

The artery is usually derived from the thyroid axis, but, not unfrequently, has a different mode of origin. It was observed to arise directly from the subclavian, or in connexion with some other branch than the thyroid—e. g. the transverse cervical—in thirty-two instances. These include four cases in which it was derived from the internal mammary—plate 24, figure 6. The supra-scapular was found to arise from the axillary artery in three of the bodies registered in the table—plate 24, fig. 7;—and one example occurred of its origin from the sub-scapular branch of that artery—plate 25, fig. 1. I have observed the variations here referred to in several other cases not included in the table.

THE TRANSVERSE CERVICAL, THE SUPERFICIAL CERVICAL, AND THE POSTERIOR SCAPULAR ARTERIES.

A comparison of the best treatises on Anatomy will show considerable discrepancies as to the nomenclature and the description of the arteries known under these names. These discrepancies are attributable to the fact that the arrangement of the vessels varies considerably, and probably, also, to the neglect of the writings of their predecessors, on the part of the authors of some anatomical works.

The names assigned to the branches in the table and in the following observations have been made to correspond with those used in the anatomical treatises in general use in this country. The remarks contained in the note * will show how

* Haller ("Icon. Anatom." fascic. 2, p. 17 and 19) describes two arteries. According to his description one arises from the thyroid axis, and, after crossing the neck, ramifies in the muscles;—this is named "ramus transversus colli." The other artery—which arises from the subclavian artery externally to the anterior scalenus muscle and passes through the nerves of the brachial plexus to be distributed, &c.—is designated "cervicalis superficialis."—Was this name (as M. Cruveilhier conjectures) applied in consequence of the comparatively superficial origin of the artery?

Murray ("Descript. Arter. Corp. Hum. in tab. redact." Ed. altera p. 49,) describes likewise two separate arteries, and uses the same nomenclature. He thus speaks of the "cervicalis superficialis." "Unciæ dimidiæ a scaleno primo distantia ex superiore atque anteriore arteriæ facie enascitur, tumque statim inter nervos brachiales se abscondit," &c.

Sœmmering appears to recognise two distinct branches, and speaks of that given from the third part of the subclavian artery under the name "cervicalis superior sive superficialis."—"De Corp. Hum. Fabrica," t. 5, p. 183.

J. Bell follows the same arrangement of the arteries as the preceding writers. He describes "the transverse artery of the neck, or transversalis colli," as a branch of the inferior thyroid; and remarks, under the head "arteria cervicalis superficialis," "The subclavian artery has got from under the muscle, and has passed the splenii a little way before it gives off this superficial cervical." "The Anat. of the Human Body," by J. and C. Bell, 7th ed. vol. 2, p. 163.

Bichat mentions but one artery, which he names "artère scapulaire postérieure," and describes it as arising frequently from the inferior thyroid, and occasionally from the axillary (the subclavian externally to the scalenus muscle).—"Anat. Descript. t. 4, p. 222—nouv. edit."

Boyer describes but a single branch, naming it "artère cervicale transverse." He speaks of the origin in the same manner as Bichat, and, in treating of the branches given at the side of the neck, says "Parmi ces rameaux, il y en a ordinairement un plus considerable, auquel on pourroit donner le nom *d'artère cervicale superficielle*, parce qu'il se perd dans le tissu cellulaire et dans la peau de la partie inférieure et latérale du cou."—"Traité Complet d'Anat." t. 3, p. 76, Edit. 4.

J. F. Meckel applies the designation "Oberflächliche oder quere Nackenpulsader" to the single vessel which he describes—thus making the names superficial cervical and transverse cervical synonymous. "Handbuch der Menschlich. Anat." B. 3, S. 148.

Tiedemann and Weber describe two separate branches corresponding in distribution to the third mode of arrangement mentioned in the text. In the works of these anatomists, the small branch given from the thyroid is named "arteria cervicalis superficialis" and the larger branch which arises directly from the subclavian is denominated "arteria transversa colli, seu, dorsalis scapulæ."

"Icones Arter." tab. 6 and 10,—and "F. Hildebrandt's Handbuch der Anat. des Menschen, besorgt von E. H. Weber."—Edit. 4.

H. Cloquet, like Bichat and Boyer, mentions one artery only, and to designate it, he combines the names used by them. This anatomist gives the distinctive appellation superficial cervical ("artère cervicale superficielle") to one of the branches —apparently following up the suggestion in the extract from Boyer's work. "Traité d'Anat. Descript." t. 2, p. 462, Edit. 5.

Considering the influence which the treatises of Bichat and Boyer have exercised on the modern Anatomical works of this country, it is very probable that the present manner of viewing the arteries in question has been derived from them, and that the change in the application of the name "superficialis colli" is due to one of them.

Professor Harrison, ("The Surgical Anatomy of the Arteries," &c. vol. 1, p. 130,) speaks of the "Transversalis Colli" as dividing "into two principal branches, viz. the arteria cervicalis superficialis and arteria scapularis posterior;" and in describing the latter, states the fact that it "frequently arises distinctly from the trunk of the subclavian artery external to the scaleni muscles."

far they agree, and in what respect they differ from the nomenclature introduced or adopted by some of the ablest anatomists.

The examination of a large number of bodies has shown that the arteries under consideration present one of three distinct modes of arrangement; the deviations from these are so slight, that every case may be readily assigned to one or other of them.

(1.) A considerable artery (transverse cervical—arteria transversalis colli) arises from the thyroid axis with the suprascapular, and crosses the side of the neck at some distance above the clavicle and the last-named artery, as far as the levator anguli scapulæ, close to which muscle it divides into two principal branches. *a*. One of these (the superficial cervical—arteria superficialis cervicis) runs superficially to the muscle just named, and ramifies under the trapezius, distributing branches to it and the muscles beneath it. *b* The other branch (posterior scapular—arteria scapularis posterior) lies much more deeply than the preceding; it sinks under the levator anguli scapulæ, and turns downwards along the base of the scapula, beneath the rhomboid muscles.

This disposition of the arteries existed in the body, of which the second plate is a representation.

(2.) There are two separate arteries of nearly equal size. *a*. One arises as in the preceding case from the thyroid, and has the same course across the neck. It ends in branches under the trapezius muscles. From the similarity of the distribution of this artery to the superficial branch of the transverse cervical noticed in the foregoing paragraph, this is entitled to the same name (superficial cervical). *b*. The second artery usually arises from the third part of the subclavian, and, like the deep branch in the former case, is directed along the posterior margin of the scapula under the same muscles. This must obviously be named the posterior scapular artery.

This mode of arrangement of the vessels is illustrated in the first and sixteenth plates.

(3.) In this as in the second case there are two arteries; but one is much smaller, and the other larger, than those which

belong to that arrangement. *a.* The first artery is very slender. Arising from the thyroid, it has the usual course of the transverse cervical, and is expended in small ramifications at the side of the neck between the sterno-cleido-mastoid and the trapezius muscles. This might be considered to correspond to a part of the superficial cervical. *b.* An artery of considerable size given from the third part of the subclavian divides opposite the levator anguli scapulæ into two principal divisions. One of these supplies the trapezius with the muscles which it covers, and may be regarded as corresponding to the greater part of the superficial cervical of the other cases. The other division of the artery has the usual course of the posterior scapular.

The disposition of the arteries here pointed out was present in the body from which the third and the nineteenth plates were drawn. The size, the division, and the arrangement of the vessels are illustrated in the latter plate.

Transverse cervical artery.—This vessel may, according to the above statement, be regarded as the common trunk of the superficial cervical and the posterior scapular.

In the bodies registered in the table, it was found to arise

Internally to the anterior scalenus muscle in	120 cases
under that muscle in	11
beyond it in	6

The artery is generally derived from the thyroid axis, but the origin was found

Connected to other branches than the thyroid—usually to the supra-scapular alone, occasionally to this branch and the internal mammary conjointly—in	16 cases
It arose singly from the subclavian in	14

Branches.—The ascending cervical artery is occasionally a branch of the transverse cervical. Four examples are noticed in the table.

Posterior scapular.—The origin of this artery as a separate branch of the subclavian, is noted in the table as

Internal to the anterior scalenus muscle in	1 instance.
under it in	43
beyond it in	101

It usually extends as far as the lower angle of the scapula. I have sometimes seen it end opposite the spine of that bone, and in such cases one or two of the posterior branches of the intercostal arteries were distributed instead of this vessel.

Branches.—Besides those usually derived from it, the "profunda cervicis" took origin from the posterior scapular in four cases.

Superficial cervical.—The artery, noticed under this name in the second and third of the modifications described above, has occasionally some peculiarities in its origin.

In the table it is stated to have arisen

From the supra-scapular artery in	7 cases
directly from the subclavian in	2
" from the thyroid artery in	1

THE ASCENDING CERVICAL ARTERY.

The origin.—This branch usually arises from the inferior thyroid, where that vessel is about to incline inwards behind the common carotid artery; but it is occasionally derived from the subclavian artery directly or from one of the branches, *e. g.* the transverse cervical: the supra-scapular: a trunk common to these two arteries: and the superficial cervical. Illustrations of these variations in the origin will be found in plate 21, figures 5, 7, and 9: plate 23, figures 3, 8, and 10: and plate 24, figures 1 and 6.

The ascending cervical is sometimes of much larger size than usual, and takes the place of the occipital, which is ordinarily a branch of the external carotid. Five examples of this variation are noted in the table. When the occipital has this mode of origin, it generally occupies the usual position of that vessel in reference to the muscles and to the bones. I have occasionally seen it lie below the transverse process of the atlas instead of being above that bone. See plate 24, fig 3.

Branches.—The most remarkable peculiarity in reference to the branches is, that one is occasionally found to take the place of the "profunda cervicis" at the upper part of the neck when that artery is small. This peculiarity is stated in the table to have occurred in seven instances, but I have seen

a greater number. It is represented in the third figure of the 25th plate.

THE INTERNAL MAMMARY ARTERY.

The condition of this artery was noted in the table in 297 instances—those of the right and of the left side being added together.

The origin was found to be placed

	RIGHT.	LEFT.	
Internally to the anterior scalenus muscle in .			290
Under that muscle in—see plate 21, figure 6 .	0	1	1
Beyond it—plate 21, figures 7, 8, 10 . . .	2	4	6

When the origin is placed externally to the scalenus, the distance from the muscle varies. In one of the cases above referred to, the internal mammary arose beyond the first rib, and therefore from the axillary artery (plate 24, figure 4).

I have not seen any example of this vessel deviating to any extent from its usual position in the opposite direction—i. e. inwards or towards the aorta. Neubauer saw one case in which it was derived from the innominate artery, and Boehmer* has given the description and a figure of one in which it arose from the arch of the aorta. In Neubauer's case "the innominate artery, at the distance of three Paris lines from its origin, gave off the right internal mammary. This branch made immediately a peculiar curve under the subclavian vein, and passed forwards and to the right side, across the superior vena cava, &c. &c."†

Instead of arising directly from the subclavian artery, the internal mammary was found connected at its origin with some of the other branches, or derived from them in 20 cases.

They were disposed as follows :—

	RIGHT.	LEFT.	
Combined with the thyroid axis or arising from it .	6	9	15
" with the common trunk of the supra-scapular and the transverse cervical in	3	2	5

Branches.—The internal mammary occasionally gives rise to the supra-scapular. This occurred in four of the cases noticed in the table, and a representation of it is given in the sixth figure of the twenty-fourth plate. A bronchial branch of considerable size was observed to arise from this

* Ante, p. 53, and plate 6, figure 12. † Erdmann, loc. citat. p. 37.

artery in four of the same cases; an example of such a branch, but of more than usual size, is shown in plate 24, fig. 5.

I have more than once seen a branch descend from the internal mammary and run vertically at the side of the thorax, crossing the internal surface of a few of the ribs about their middle. Otto mentions two cases observed by himself in which such branches were present, and he adds this comment, "that the anomaly may, in penetrating wounds of the chest, fractured ribs, &c., give rise to internal hemorrhage." *

THE SUPERIOR INTERCOSTAL ARTERY.

The table contains reference to the state of this artery in 276 cases,—161 being on the right side, and 115 on the left.

The origin was found as follows:—

	RIGHT.	LEFT.
Internally to the anterior scalenus muscle . . .	24	61
Under that muscle	134	54
Externally to it	—	—
From the vertebral artery	2	—
thyroid	1	—

From this statement it appears that on the right side the artery arose most frequently beneath the scalenus; and that on the left side the origin was placed somewhat more frequently to the inner side of the muscle than beneath it.

The size varies frequently, and with it the extent to which the vessel reaches. In general the artery supplies two intercostal spaces, sometimes three or only one; and in rare cases it is altogether wanting.

I have in a few instances seen the intercostal artery pass between the necks of one or two ribs and the transverse processes of the dorsal vertebræ; and in one instance, after arising from the vertebral artery it descended through the foramen in the transverse process of the last cervical vertebra, and then continued between the bones just named—see plate 22, figure 5.

Branches.—Besides those to the intercostal spaces, the superior intercostal usually furnishes one or two slender offsets

* Compendium of Human and Compar. Pathol. Anat. transl. by South, p. 302, and "Neues Verzeichniss der Anat. Sammlung, &c., zu Breslau." ppn 1927.—In the preparation mentioned in the latter publication the unusual branch existed on both sides.

along the nerves to the spinal canal (plate 25, fig. 3); and in most cases the deep cervical is a branch of this artery.

THE DEEP CERVICAL ARTERY.—AR. PROFUNDA CERVICIS.

This artery is represented in the first figure of the eighteenth plate.

The origin. Among 285 cases it arose

from the subclavian in . . .	14 abt. 1 in 20$\frac{1}{2}$
from the posterior scapular in . .	5
from the superior intercostal—or was conjoined with that vessel at its origin .	266

Of the cases in which the "profunda" was a separate branch of the subclavian, it arose

internally to the anterior scalenus muscle in	Right	3
	Left	2
		—5
under it in	Right	6
	Left	3
		—9

In consequence of the constancy with which it is derived from the superior intercostal, the deep cervical might be considered analogous to the posterior branch of the aortic intercostal arteries, from which it differs only in being of greater size.

The deep cervical artery is in most cases directed to its destination at the back part of the neck between the last cervical vertebra and the first rib; but the deviations from this position are not unfrequent. In some instances it inclined backwards between the transverse processes of the sixth and seventh vertebræ. In seventeen cases it separated from the superior intercostal within the chest, and passed backwards below the first rib and the transverse process of the first dorsal vertebra (in a few instances, between these bones): and it was occasionally placed below even the second rib—see plate 25, figure 2.

The "profunda" was not unfrequently of small size, and when this occurred, another or supplemental branch was found to make up for the defect; so that in such cases

two deep cervical arteries were present. The additional artery took origin in some cases (as well as the ordinary branch) from the intercostal—one being situated below, the other above the first rib ; and it was seen to emanate—very rarely, however—from the posterior scapular and from the inferior thyroid. But most frequently the second " profunda " derived its origin from the ascending cervical branch of the inferior thyroid, and took its course backwards beneath the transverse process of the third cervical vertebra ; this occurred in seven of the cases recorded in the table, and it is represented in plate 25, figure 3.

Besides the foregoing branches, which are all of considerable size, a very slender artery is frequently given from the subclavian, while under cover of the anterior scalenus muscle. This little artery has received no name; it ramifies among the nerves of the brachial plexus and in the spinal canal, see plate 18, figure 2. There are occasionally more small branches of this kind than one.

THE VEINS CONNECTED WITH THE SUBCLAVIAN ARTERIES.

The ordinary disposition of the veins, which are in the immediate neighbourhood of the subclavian arteries, will, in the first place, be briefly referred to ; and, secondly, the peculiarities which occur in these vessels will be noticed.

a. The subclavian vein lies below the level of the subclavian artery, and is almost altogether concealed by the clavicle, whereas the artery is, to a greater or less extent, higher than that bone ; and the second division of the artery being behind the scalenus muscle, at the same time that the vein is in front of it, these vessels are here separated one from the other to a greater degree than in any other part. The first division of the artery is crossed immediately to the inner side of the scalenus muscle, by the internal jugular and the vertebral veins—plate 2 and plate 17, figure 1. In the last division of its course, the artery is covered—more or less completely in different cases—by the external jugular vein, which receives in this situation two other venous branches, namely, the suprascapular and the transverse cervical,—those which accompany

the arteries thus named. The veins here referred to, and their position with respect to the arteries, are shown in the second and seventeenth plates.

Some peculiarities of the Veins. I have not observed any instance of change of the position, or other remarkable peculiarity of the subclavian vein. M. Robert describes a case in which the subclavian vein having been, as is stated, higher than usual and in front of the artery, was transfixed and in part included in a ligature, in an attempt to tie the subclavian artery.* A case is recorded by M. Blandin in which there occurred a more remarkable departure of this vein from its usual position. It was placed between the scaleni muscles with the artery.† M. Velpeau‡ states that he observed an example of the vein similarly placed. Morgagni§ in one instance found, on both sides of the same body, two venous trunks placed side by side, instead of the usual subclavian vein. On the right side, the two parts into which the vein was divided, were of equal size, and about five inches in length. They began in the axillary vein, and reached to the point at which the internal jugular ends. On the left side, the divisions were of unequal size — one being very slender—and as they measured less than two inches in length, they included but little of the axillary vein.

The anterior jugular vein. This vein is not constant, but

* "Un homme qui portait une tumeur anévrismatique de l'artère sous-clavière developpée en avant, fut soumis à la ligature de cette artère à sa sortie des scalènes. La tumeur gênait beaucoup l'opérateur; cependant une partie que l'on crut être l'artère, car étant soulevée les pulsations cessèrent dans la tumeur, fut comprise dans la ligature. Des accidens graves se manifestèrent; le malade succomba. A l'autopsie, on trouva que les parties embrassées dans la ligature étaient un des nerfs du plexus brachial, et de plus une partie de la veine sous-clavière que l'instrument et le fil avaient percée de part en part. Ici existait, comme le démoutra la dissection, la variété dont je parle, c'est-à-dire que la veine sous-clavière passait très-haut au devant des scalènes," &c.—Journal des Progrès des Sciences et Institutions Médicales, p. 203, vol. 7, 1828.

† "Mais ce qui est excessivement rare, et ce que j'ai vu une seule fois, c'est le passage de la veine axillaire avec l'artère de ce nom dans l'intervalle des muscles scalènes."—Traité d'Anatomie Topographique, &c. p. 210.

‡ Traité Complet d'Anat. Chirurg, t. 1, p. 494.

§ "Subclavia vena dextra ex duabus constabat quæ in axillari jam incipientes, non ante in unam confluebant quam ad ostium accessissent Jugularis internæ, et insula ficret longa digitos transversos quinque. Erant autem duæ illæ quæ insulam comprehendebant, venæ pari ambæ crassitudine; et a sinistris in Axillari vena erat insula multo brevior, quippe non longa digitos duos, imparibusque comprehensa venis, altera videlicet multo quam altera, tenuiore."—De Sedib. et Causis Morborum, &c. Epist. 69, art. 2.

its presence is of frequent occurrence. It has been already mentioned and delineated in connexion with the common carotid artery—page 14 and plate 4, figure 3. From the neighbourhood of that artery, the vein inclines obliquely outwards, under the sterno-cleido-mastoid muscle, and, after crossing the anterior scalenus, ends either in the external jugular or directly in the subclavian vein—plate 2 and plate 17, figures 1 and 2.

The external jugular is, in some cases, double, and in others of but very small size. In one instance, this vein instead of terminating directly at the root of the neck, descended over the clavicle, and, after turning inwards between that bone and the subclavius muscle, joined the subclavian vein—plate 25, figure 4.

The supra-scapular and the transverse cervical veins, are occasionally directed inwards over the anterior scalenus muscle to join the internal jugular; or one of them may be found to have this disposition, while the other ends in the external jugular as usual. In some instances, these veins form a plexus over the third part of the subclavian artery, by means of communicating branches, extending from one to the other.

Not unfrequently a small vein courses along the subclavian artery, in the manner represented in the second figure of the seventeenth plate.

Cephalic vein. This vein, in almost all cases, ends below the clavicle in the axillary vein; but in one body which came under my observation, it extended upwards over the clavicle, and terminated with the external jugular in the subclavian vein. When the cephalic vein has this disposition, it would bear important relation to an operation on the subclavian artery—see plate 25, figure 5.

THE NERVES CONNECTED WITH THE SUBCLAVIAN ARTERIES.

I have noticed but few deviations from the ordinary arrangement of the nerves, situated in the immmediate neighbourhood of the subclavian arteries.

Pneumogastric nerve—N. vagus. When the subclavian artery

and the aorta have their usual course, this nerve has not been observed—so far as I know—to present any remarkable departure from the ordinary disposition ; but some of the variations of the vessels are accompanied by changes in the nerves which require notice.

In the cases in which the right subclavian artery arose from the left side of the arch of the aorta, the inferior laryngeal nerve was found,—in all the instances in which its condidition was noticed,—to arise opposite the lower part of the larynx, whence it was directed inwards behind the common carotid artery.* The nerve, when so disposed, can scarcely be named "recurrent," inasmuch as it has but little of the direction which that designation implies.

Professor Hart, in the paper referred to, which was written with the view of accounting for this condition of the laryngeal nerve, makes the following observations.

"In the earlier periods of the existence of the fœtus, the rudiment of the head appears as a small projection from the upper and anterior part of the trunk, the neck not being yet developed. The larynx at this time is placed behind the ascending portion of the arch of the aorta; while the brain, as it then exists, is situated so low, as to rest on the thymus gland, and front of that vessel. Hence it is, that the inferior laryngeal nerves pass back to the larynx, separated by the ascending aorta, the left going through its arch, while the right goes below the arteria innominata.

"As gestation advances, the head becomes more distinct and the neck begins to be formed after the second month, which, as it lengthens, has the effect of removing the brain upwards to a greater distance, and of drawing out the larynx from the chest, in consequence of which, the nerves of the par vagum and their recurrents become elongated, and hence the circuitous route the latter are found to take afterwards, forming loops in which the aorta and right subclavian artery are, as it were, suspended."

When the arch of the aorta is directed to the right instead of to the left side, the laryngeal nerves probably undergo a cor-

* Dr. Stedman, in Edinb. Med. and Surg. Journal, 1823. Dr. Hart, in same Journal, 1826. Also plate 12, fig. 4, and plate 20, fig. 5.

responding change—the nerve of the right side winding round the aorta, and that of the left side ascending from behind the subclavian artery. The condition of the nerves is not stated in the account of these cases; but in the delineation given of one, they appear to have that disposition. See plate 7, figure 3. In the description accompanying his representation of the case—from which ours is copied—Bernhard makes no mention of the nerves.

In one of those singular cases—the only one in which the arrangement of the nerves has been recorded—in which the arch being directed over the right bronchus, the left subclavian artery arises from a pouch,* the laryngeal nerve of the right side took its upward course behind the arch of the aorta; and the nerve of the left side was found to turn round the ligamentum arteriosum.† Plate 7, figure 1.

Phrenic nerve. This nerve generally crosses very obliquely from the outer to the inner side of the anterior scalenus, and is separated from the subclavian artery by a few of the innermost fibres of the muscle; but occasionally it is in contact with the artery.

I have, in one instance, seen the nerve cross the subclavian artery on the outer side of the muscle, over which it was then directed obliquely inwards to the thorax. The unusual position of the nerve was accompanied by a change in the place of origin of the thyroid axis. This artery arose from the third division of the subclavian. Now the nerve is often in contact with the outer side of the thyroid axis especially on the left side, and, as in the case under observation, it has the same position, it may be supposed to be, as it were, borne outwards by the artery—see plate 21, figure 7.

The phrenic nerve, in two bodies, lay in front of the subclavian vein, instead of being, as it usually is, behind that vessel.‡

* Antc, page 160.

† "Non ea quoque prætermittenda, quæ ad paris vagi ramorum ad laryngem recurrentium retroflexionem spectabat. Nempe recurrens dexter sub ipso aortæ arcu et circa eum flectebatur, sursum procedens, sinister vero circa canalem arteriosum, jam in ligamentum mutatum, reflexus ad laryngem procedebat."—Sandifort, loc. citat.

‡ Plate 25, figure 6. One of these cases was shown to me by Mr. Liston.

THE MUSCLES IN THE IMMEDIATE NEIGHBOURHOOD OF THE SUBCLAVIAN ARTERIES.

Sterno-cleido-mastoid and trapezius. The interval between these muscles is very various in different bodies. The greater part of the breadth of the former at its lower end is due to the fibres connected to the clavicle. This portion of the muscle is, in some instances, very narrow, and does not exceed in width the tendon connected to the sternum; in other cases, on the contrary, it reaches as far nearly as the middle of the clavicle, and conceals the whole of the subclavian artery. In one body the sterno-cleido-mastoid and trapezius were found actually in contact; so that there was no space between the margins of the muscles, and the upper border of the clavicle gave origin to muscular fibres in its whole length—see plate 25, figure 7. The muscles are seen of what may be considered an average size in plate 3 and plate 17, figure 2.

The *omohyoid* varies considerably in size—being in one case so broad as to cover completely the subclavian artery beyond the scalenus, and in another, on the contrary, so slender as scarcely to obscure any part of the vessel. It is usually intersected with tendon, and thus becomes digastric; but sometimes there is an interruption of only a portion of the muscular fibres, and occasionally there is no trace of tendinous intersection—plate 3 and plate 17, figure 2, illustrate these facts.

This muscle is not unfrequently found to arise from the clavicle at nearly the middle of the bone, and to cover the subclavian artery. A case of this kind is represented in plate 25, figure 8. In the same figure a slip of muscle is seen to extend from the trapezius to the sterno-cleido-mastoid, over the subclavian artery.*

Some variations in the disposition of the anterior scalenus muscle, with reference to the subclavian artery, have been mentioned in the observations upon the vessel—ante page 151, and they are illustrated in figures 1, 2, and 3 of plate 21.

* In a case brought under my notice by Mr. J. P. Potter, a muscular slip of the same kind passed through the omohyoid in the interval between the trapezius and the sterno-mastoid.

THE BONES IN THE NEIGHBOURHOOD OF THE SUBCLAVIAN ARTERIES.

The only bones which have any bearing on the anatomy of the subclavian arteries are the clavicle and the first rib. The cervical rib may be alluded to, though it is very rarely met with, and still more rarely is it found of such size as to approach the artery.

Reference has been previously made—page 151—to the influence of the direction of the shoulders on the depth of the subclavian arteries. Further observations on the position of the clavicle and the first rib appear to me to be required.

I have met with only one example of a cervical rib in connexion with the muscles and vessels. The osseous projection was, in that case, close behind the artery : but the preparation was unfortunately destroyed, even before a drawing could be made from it. The representation of an unusually good specimen of a prominent cervical rib will be found in plate 25, figure 9. The artery in this case lay probably in front of the elevated process of the first dorsal rib to which the supplemental rib is connected at its anterior end.

AXILLARY ARTERIES.

THE abbreviations in this table are made in the same manner as in the foregoing tables —namely, by the omission of letters from the end of the word : *e. g.* "circumfl." stands for circumflex ; "dorsal." for dorsalis ; "prof." for profunda ; "scap." for scapula ; "subscap." for subscapular ; "super." for superior ; "thor." for thoracic.

In some cases of prefixed names the initial letter only is retained ; thus "A." before circumfl. is used for anterior, and "P." in a like position stands for posterior. The letter "m." occasionally supplies the place of muscle, and "n." that of nerve, &c.

No.	Side of the Body.	Trunk.	Branches.
1a	R	is not embraced by the nerves of the brachial plexus.	P. Circumfl. and Subscap. arise by one trunk ; the common trunk is embraced by the nerves of the brachial plexus.
2a	L	divides into two brs.; is not embraced by the nerves of the brachial plexus.	Subscap., P. Circumfl., and both Prof. arise by one trunk, which is embraced by the nerves.
3	R	divides into two trunks, of nearly equal size, at lower margin of subscap. m.	Subscap., Super. and Infer. Prof., with A. and P. Circumfl., arise by one trunk.
	L	divides into two brs.	Ulnar arises at lower border of subscap. m. Brs. usual.
3a	R	divides into two brs ; is not embraced by the nerves.	Super. and Infer. Prof., with A. and P. Circumfl. arise by one trunk, which is embraced by the nerves.
4b	R	usual.	P. Circumfl. gives Super. Prof.
	L	usual.	P. Circumfl. gives Super. Prof.
5a	R	usual.	P. Circumfl. gives Super. Prof.
6a	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
7	R	usual.	usual.
	L	usual.	usual.
7a	R	usual.	usual.
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
7b	R	usual.	usual.
	L	usual.	usual.
7c	R	usual.	usual.
	L	usual.	usual.
8	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	usual.
9	R	divides iuto two brs.; is not embraced by the nerves.	Subscap. with A. and P. Circumfl., and Super. and Infer. Prof. by one trunk, which is embraced by the nerves.
	L	usual.	Supra-scapular is a br. of Axillary.
9a	R	usual.	usual.
	L	usual.	usual.
9b	L	usual.	P. Circumfl. ascends from Brachial.
9c	R	usual.	usual.
	L	usual.	usual.
10	R	divides into two brs.; is not embraced by the nerves.	Several Thoracic brs. arise by one trunk. Subscap. is a small br. Dorsalis Scap. and P. Circumfl., with Super. and Infer. P., arise by one trunk, which is embraced by the nerves.
	L	usual.	usual.
10a	R	usual.	Both Circumfl. and both Prof. arise by one trunk.
10b	R	usual.	usual.
	L	usual.	usual.
11	R	usual.	usual.
	L	usual.	usual.
12	R	usual.	usual.
	L	usual.	usual.
13	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
13a	R	usual.	usual.
	L	usual.	usual.
14	R	usual.	Subscap. and P. Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
15	R	usual.	usual.
	L	usual.	usual.
15a	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs. at origin of Circumfl. br.	The Radial artery arises from inner side of Axillary artery and crosses over it to the outer side. Brs. usual.
15b	R	usual.	usual.
	L	usual.	usual.
16	R	usual.	usual.
	L	usual.	usual.
17	R	usual.	usual.
	L	usual.	usual.
18	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
19	R	usual.	usual.
	L	usual.	usual.
19a	R	usual.	usual.
	L	usual.	usual.
19b	R	usual.	usual.
	L	usual.	usual.
19c	R	usual.	usual.
	L	usual.	usual.
19d	R	usual.	usual.
	L	usual.	usual.
20	L	usual.	usual.
21	R	usual.	usual.
	L	usual.	usual.
22	R	usual.	usual.
	L	usual.	usual.
23	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
	L	Besides the usual connexion with the nerves, it is crossed by ext. cutan. nerve, which is a br. of the median.	usual.
23a	R	usual.	P. Circumfl. gives the Super. Prof.
	L	usual.	
24	R	usual.	a long slender br. (Vas Aberrans) passes down from Axillary and joins Radial at its origin.
	L	usual.	usual.
25	R	divides into two brs.	Subscap., both Circumfl., and both Prof. by one trunk.
	L	divides into two brs.	Subscap., both Circumfl., and both Prof. by one trunk.
26	R	usual.	usual.
	L	usual.	usual.
27	R	usual.	usual.
	L	usual.	usual.
27a	R	usual.	P. Circumfl. ascends from Super. Prof.
28	R	usual.	usual.
	L	usual.	usual.
29	L	usual.	P. Circumfl. arises below teres maj. and latiss. dorsi m.
30	R	usual.	usual.
	L	usual.	usual.
30a	R	usual.	usual.
	L	usual.	usual.
31	R	usual.	Both Circumfl. are given by one trunk.
	L	divides into two brs.	The Radial arises from inner side of Axillary, and crosses to outer side over the larger artery. Brs. usual.
31*	R	usual.	Subscap. arising higher than usual, gives a Thoracic br.; Dorsalis Scap., and A. and P. Circumfl., with part of Prof. arise by one trunk.
	L	usual.	A. and P. Circumfl. arise by one trunk; Super. Prof. is given from Axillary.

No.	Side of the Body.	Trunk.	Branches.
31†	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
31a	R	usual.	usual.
	L	usual.	usual.
31c	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
31‡	R	usual.	Subscap., both Circumfl. and a Thoracic br. arise by one trunk.
	L	usual.	Subscap., both Circumfl. and a Thoracic br. arise by one trunk.
31d	L	divides into two brs.	Subscap., both Circumfl. and both Prof. arise by one trunk.
32	R	usual.	usual.
33	R	usual.	usual.
	L	usual.	usual.
34	L	usual.	usual.
37	R	divides into two brs.	Subscap., both Circumfl. and both Prof. arise by one trunk.
37a	L	usual.	usual.
38	R	divides into two brs.	Radial arises at subscap. m., and communicates by a cross branch with Brachial at bend of elbow. Brs. usual.
39	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
40	L	usual.	usual.
40a	R	usual.	Subscap. and both Circumfl. arise by one trunk. Thoracic brs. are given by one trunk.
41	R	usual.	usual.
41a	R	usual.	P. Circumfl. ascends from Super. Prof.
42	R	usual.	usual.
43	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and Super. Prof. arise by one trunk, which is embraced by the nerves.
44	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
	L	usual.	usual.
45	R	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is embraced by the nerves.
	L	usual.	usual.
47	R	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is crossed by the nerves.
48	R	usual.	S. and P. Scap. arise by one trunk at the junction of Subclav. and Axillary arteries.
	L	usual.	Dorsalis Scap. is a separate br.; A. and P. Circumfl. arise by one trunk.
48a	R	usual.	usual.
49a	R	usual.	usual.
	L	usual.	usual.
50	R	usual.	usual.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and Super. Prof. arise by one trunk, which is embraced by the nerves.
51	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Several Thoracic brs. are given from one trunk.
52	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
53	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
54	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
56	R	divides into two brs.; at lower margin of subscap. m.	Radial arises from Axillary. P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
57	R	usual.	Subscap. arises in two parts (Dorsalis Scap. being a distinct br.); P. Circumfl. and Super. Prof. arise by one trunk; the latter descends behind teres maj. and latissimus dorsi m.

No.	Side of the Body.	Trunk.	Branches.
	L	usual.	Subscap. arises in two parts (Dorsalis Scap. being a separate br. of Axillary).
58	R	usual.	P. Circumfl. gives Super. Prof.
	L	usual.	P. Circumfl. gives Super. Prof.
59	R	usual.	usual.
	L	usual.	usual.
60	R	usual.	usual.
	L	usual.	P. Circumfl. ascends from Super. Prof.
61	R	usual.	Subscap. and Thoracica Longa arise by one trunk. Dorsalis Scap. is a separate branch.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is embraced by the nerves.
62	R	usual.	P. Circumfl. given in two parts,—one ascends from Super. Prof.: a second, small one, arises in the usual situation.
	L	usual.	Subscap., and P. Circumfl. arise by one trunk.
63	L	usual.	P. Circumfl. ascends from Super. Prof.
64	R	usual.	P. Circumfl. gives Super. Prof., and a small br. is also given in the usual situation of the latter.
	L	usual.	P. Circumfl. gives Super. Prof.
65	R	usual.	Subscap. and a Thoracic br. arise by one trunk. Dorsalis Scap. and both Circumfl. are also given by a common trunk.
	L	usual.	usual.
66	R	usual.	usual.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
67	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap., P. Circumfl. and a Thor. br. arise by one trunk.
68	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
69	R	usual.	usual.
	L	divides into two brs.	Subscap., both Circumfl. and both Prof. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
70	R	usual.	Thoracic. Acromial. gives three other brs. Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and both Prof. arise by a common trunk, which is embraced by the nerves.
71	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	usual.
72	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
73	R	usual.	P. Circumfl. gives part of Super. Prof.
	L	usual.	usual.
74	R	usual.	usual.
	L	usual.	P. Circumfl. gives Dorsalis Scap.
75	R	divides into two brs.; is not embraced by the nerves.	Subscap., Super. Prof. and both Circumfl. arise by one trunk, on which the nerves cross. Prof. passes in front of latissimus dorsi m.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
76	R	divides into two brs.	Radial arises from Axillary. Brs. usual.
	L	usual.	usual.
77	R	usual.	Subscap. arises $2\frac{1}{2}$ inches higher than usual. A. and P. Circumfl. arise by one trunk. S. Prof. given from Axillary.
	L	usual.	Subscap. $2\frac{1}{4}$ inches higher than usual. A. and P. Circumfl. arise by one trunk.
78	R	Two additional brs. of nerves cross from ext. cutan. n. to median over the artery.	Thoracic brs. arise by one trunk. Subscap. arises $2\frac{1}{2}$ inches above lower margin of subscap. m., and gives P. Circumfl.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
79	R	usual.	usual.
80	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
81	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
82	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
83	R	divides into two brs.; is not embraced by the nerves.	Subscap., both Prof., both Circumfl. and Anastomotic arise by one trunk, which is embraced by the nerves.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Prof., both Circumfl. and Anastamotic arise by one trunk, on which the nerves cross.
84	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	P. Circumfl. gives Super. Prof.
85	R	usual.	usual.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and Super. Prof. arise by one trunk.
86	R	usual.	usual.
	L	usual.	usual.
88	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Thoracic brs. and P. Circumfl. arise by one trunk.
89	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	is not crossed by median n. the heads of which unite at the beginning of the lower third of the arm.	Subscap. and a Thoracic br. arise by one trunk.
90	R	usual.	usual.
	L	usual.	usual.
91	R	usual.	usual.
	L	usual.	usual.
92	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	A. and P. Circumfl. arise by one trunk. P. Circumfl. gives part of Super. Prof., which lies behind lat. dorsi m.
93	R	usual.	usual.
	L	usual.	usual.
94	R	usual.	Subscap. and P. Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
95	L	usual.	P. Circumfl. ascends from Super Prof.
96	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
97	R	usual.	usual.
	L	usual.	usual.
98	R	usual.	Super. Prof. is a br. of Axillary.
	L	divides into two brs.	Radial arises immediately below the clavicle. Brs. usual.
99	R	usual.	S. Scap. is the first br.; it arises opp. upper part of coracoid process.
	L	usual.	P. Circumfl. ascends from Prof.
100	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
101	R	usual.	usual.
	L	usual.	usual.
102	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and Super. Prof. arise by one trunk, which is embraced by the nerves.
103	R	divides into two brs.; is not embraced by the nerves.	Radial arises opp. lower margin of coracoid process; nerves cross on the larger and deeper trunk. Subscap. arises in two parts. (Dorsal. Scap. is a distinct branch of the Axillary.) Both Circumfl. arise by one trunk.
	L	usual.	Both Circumfl. arise by one trunk.
104	R	usual.	usual.
	L	usual.	usual.
105	R	usual.	usual.
	L	usual.	usual.
106	R	usual.	Subscap. arises in two parts. (Dorsal. Scap. is a distinct br. of the Axillary.)
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
107	R	usual.	usual.
	L	divides into two brs.	Radial arises opp. the head of humerus. Brs. usual.
108	R	usual.	Both Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
109	R	usual.	usual.
	L	usual.	P. Circumfl. ascends from Super. Prof.
110	R	usual.	usual.
	L	usual.	Both Circumfl. arise by one trunk.
111	R	usual.	Both Circumfl. arise by one trunk.
	L	usual.	Subscap. arises in two parts. (Dorsal. Scap. is a distinct br. of the Axillary.)
112	R	usual.	usual.
	L	usual.	usual.
113	R	usual.	P. Circumfl. gives Super. Prof.
	L	usual.	usual.
114	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.	Ulnar arises opp. head of humerus. Brs. usual.
115	R	usual.	Subscap. gives Super. Prof.
	L	usual.	Subscap. gives Super. Prof.
116	R	usual.	usual.
	L	usual.	usual.
117	R	usual.	usual.
	L	divides into two brs.	Ulnar arises one inch above lower margin of Subscap. m. Brs. usual.
118	R	divides into two brs. of nearly equal size.	Subscap., both Circumfl. and both Prof. arise by one trunk.
	L	usual.	Both Circumfl. arise by one trunk.
119	R	usual.	Subscap. and a Thoracic br. arise by one trunk. Both Circumfl. arise by one trunk.
	L	usual.	usual.
120	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
	L	divides into two brs. of nearly equal size.	Subscap., both Circumfl. and Super. Prof. arise by one trunk.
122	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
123	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
124	R	usual.	P. Circumfl. ascends from Super Prof.
	L	usual.	P. Circumfl. gives Super. Prof.
125	R	usual.	usual.
	L	usual.	usual.
126	L	usual.	usual.
127	R	usual.	A. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
128	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. and both Circumfl. arise by one trunk.
129	R	usual.	P. Circumfl. ascends from Super. Prof.
	L		Besides the usual branches a Vas Aberrans is given off, which arises from the Axillary and proceeds superficially to the Brachial artery to join the Radial soon after its origin.
130	R	usual.	usual.
	L	usual.	P. Circumfl. ascends from Super. Prof.
131	R	usual.	Nearly usual.
	L	usual.	Subscap., Thoracica Longa and P. Circumfl. arise by one trunk.
132	R	usual.	usual.
	L	usual.	usual.
133	R	usual.	usual.
	L	usual.	Both Circumfl. arise by one trunk.
134	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
135	R	usual.	usual.
	L	usual.	Subscap. and both Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
136	R	usual.	Subscap. and a Thoracic br. arise by one trunk. Dorsalis Scap. a separate br.
	L	usual.	Subscap. and a Thoracic br. arise by one trunk. P. Circumfl. ascends from Super. Prof.
137	R	usual.	usual.
	L	usual.	usual.
138	R	usual.	nearly usual.
	L	usual.	Subscap. and a Thoracic br. arise by one trunk.
138[a]	R	usual.	Both Circumfl. arise by one trunk.
139	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
140	R	usual.	usual.
	L	usual.	usual.
141	R	usual.	usual.
145	R	usual.	Subscap. and a Thoracic br. arise by one trunk. Both Circumfl. arise by one trunk.
	L	usual.	usual.
146	R	usual.	usual.
	L	usual.	usual.
147	R	usual.	usual.
	L	usual.	usual.
148	R	usual.	usual.
149	R	usual.	usual.
	L	usual.	usual.
150	R	usual.	usual.
	L	usual.	Both Circumfl. and Super. Prof. arise by one trunk.
151	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Both Circumfl. arise by one trunk.
152	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
153	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
154	R	usual.	usual.
155	R	usual.	usual.
	L	usual.	usual.
156	R	usual.	Both Circumfl. arise by one trunk.
157	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
158	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
160	R	usual.	Subscap. arises in two parts, and gives a Thoracic br. P. Circumfl. and Dorsalis Scap. arise by one trunk.
	L	usual.	Subscap. arises in two parts, and gives a Thoracic br., P. Circumfl. and Dorsalis Scap. arise by one trunk.
164	R	usual.	usual.
165	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	usual.
168	R	usual.	usual.
	L	usual.	usual.
169 f	R	usual.	Subscap. in two parts. Dorsalis Scap. and P. Circumfl. arise by one trunk.
169g	R	usual.	Subscap. in two parts. Dorsalis Scap. and P. Circumfl. arise by one trunk.
169o	R	divides into two unequal brs. at head of humerus.	Radial arises opp. head of humerus. The larger br. gives P. Circumfl. and both Prof. by one trunk; other brs. usual: The two brs. into which the artery divides are connected by a short br. at the bend of the elbow.
171	R	usual.	usual.
	L	usual.	usual.
172	R	usual.	usual.
	L	usual.	usual.
174	R	usual.	usual.
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
176	R	usual.	usual.
	L	divides into two unequal trunks opp. the head of humerus. The nerves cross on the deeper trunk.	Radial arises opp. head of humerus. The brs. are given from the larger and deeper trunk.
177	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
178	R	usual.	usual.
	L	usual.	usual.
179	R	usual.	usual.
	L	nsual.	Subscap. arises in two divisions. Dorsalis Scap. and P. Circumfl. arise by one trunk.
180	L	usual.	Subscap. and P. Circumfl. arise by one trunk. Other brs. nearly usual.
181	R	is crossed in two different situations by brs. of brachl. plexus of nerves; the additional crossing is opp. corac. process of scapula.	usual.
	L	Same arrangement of nerves as on right side.	usual.
182	R	usual.	usual.
	L	A second br. of brachial plexus crosses the artery opp. coracoid process.	usual.
183	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
184	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.; is not embraced by the nerves.	Subscap., both Circumfl. and Super. Prof., arise by one trunk, which is crossed by the nerves of brachial plexus.
185	R	usual.	usual.
	L	usual.	Both Circumfl. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
186	R	divides into two brs., and is not crossed by nerves as usual.	Subscap., both Circumfl. and both Prof. arise by one trunk, which, after giving the brs. named, becomes Interosseous. The nerves embrace this trunk.
	L	divides into two brs.	Ulnar is given near the clavicle.
187	R	is crossed by a second br. of the brachial plexus of nerves, and divides into two brs. opp. lat. dorsi m.	Both Circumfl. arise by one trunk. Other brs. usual. Ulnar rises opp. lat. dorsi m.
	L	is crossed by a second br. of the brachial plexus of nerves, and divides into two brs. opp. lat. dorsi m.	Both Circumfl. arise by one trunk. Other brs. usual. Ulnar rises opp. lat. dorsi m.
188	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
189	R	usual.	Both Circumfl. arise by one trunk.
	L	usual.	usual.
190	R	usual.	usual.
	L	usual.	usual.
191	R	is crossed by a small additional br. of brachial plexus of nerves.	Subscap. and P. Circumfl. arise by one trunk.
	L	is crossed by a small additional br. of brachial plexus of nerves.	nearly usual.
192	R	usual.	nearly usual. A long muscular br. descends to outer side of biceps m.
	L	usual.	Both Circumfl. arise by one trunk.
193	R	is crossed by a small additional br. of brachial plexus of nerves.	usual.
	L	usual.	usual.
194	R	usual.	usual.
	L	usual.	Subscap. and P. Circumfl. by one trunk.

No.	Side of the Body.	Trunk.	Branches.
195	R	usual.	usual.
	L	usual.	Both Circumfl. by one trunk.
196	R	usual.	Subscap. arises in two parts. P. Circumfl. and Dorsalis Scap. by one trunk.
	L	usual.	Subscap. arises in two parts. Both Circumfl. and Dorsalis Scap. by one trunk.
197	L	usual.	usual.
198	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
199	R	divides into two brs.; is not crossed by nerves as usual.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is crossed by the nerves.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
200	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.; is not crossed by nerves as usual.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is crossed by the nerves.
201	R	usual.	Subscap. arises in two parts. P. Circumfl. and Dorsalis Scap. given by one trunk.
	L	usual.	usual.
203	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
204*	R	usual.	usual.
205	R	usual.	Both Circumfl. arise by one trunk, which gives Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
207	R	usual.	P. Circumfl. ascends from Super. Prof.
207 a	R	usual.	Subscap. gives a Thoracic br.
	L	is crossed by a small br. of median n. high up.	Thoracic brs. arise by one trunk. P. Circumfl. ascends from Super. Prof.
207 b	R	usual.	usual.
	L	usual.	Thoracic brs. arise by one trunk.
207 c	R	usual.	Thoracic brs. arise by one trunk.
	L	usual.	Thoracic brs. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches.
209	R	usual.	P. Circumfl. ascends from Super Prof.
210	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
211	L	usual.	usual.
212	R	usual.	P. Circumfl. ascends from Super. Prof.
213	R	usual.	usual.
	L	usual.	usual.
214	R	usual.	P. Circumfl. ascends from Super. Prof.
215	R	usual.	P. Circumfl. ascends from Super. Prof. One Thoracic br. from Axillary; a second from Subscap.
216	R	usual.	usual.
	L	usual.	P. Circumfl. ascends from Super. Prof.
217	R	usual.	P. Circumfl. ascends from Super. Prof.
218	R	usual.	usual.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
219	R	usual.	usual.
	L	usual.	usual.
220	R	usual.	Both Circumfl. and Super. Prof. arise by one trunk.
221	R	divides into two brs.; is not crossed by nerves.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is crossed by the nerves.
	L	divides into two brs.; is not crossed by nerves.	Subscap. both Circumfl. and both Prof. arise by one trunk, which is crossed by the nerves.
222	R	usual.	usual.
	L	usual.	A Vas Aberrans arises opp. head of humerus, and joins Radial at the bend of the elbow. Other brs. usual.
223	R	usual.	P. Circumfl. ascends from Super Prof.
	L	usual.	usual.
224	R	usual.	P. Circumfl. ascends from Super Prof.
225	R	usual.	Subscap. gives Supra-Scap.

No.	Side of the Body.	Trunk.	Branches.
226	R	divides into two brs. opp. coracoid process ; is not crossed by nerves.	Subscap. arises in two parts. Dorsalis Scap., both Circumfl. and Super. Prof. arise by one trunk, on which the nerves cross.
	L	usual.	P. Circumfl. ascends from Super. Prof. A Vas Aberrans given from Axillary joins Radial at the middle of the fore-arm.
227	R	usual.	usual.
	L	usual.	usual.
229	R	usual.	usual.
	L	crossed by a second external origin of median nerve.	usual.
230	R	usual.	Both Circumfl. and Super. Prof. arise by one trunk. The latter passes behind lat. dorsi and teres major m.
	L	crossed twice by nerves	P. Circumfl. and Super. Prof. arise by one trunk.
231	R	usual.	nearly usual.
	L	usual.	usual.
232	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
233	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
234	R	crossed by the junction of ulnar n. with inner head of mediau n.	usual.
	L	usual.	P. Circumfl. ascends from Super. Prof.
235	R	usual.	P. Circumfl. asceuds from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super Prof.
236	R	usual.	Subscap. and P. Circumfl. arise by one trunk. A Vas Aberrans arises at the tendon of lat. dorsi m. and joins Radial near the bend of the elbow.
237	R	usual.	usual.
	L	usual.	usual.
238	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches.
239	L	usual.	usual.
240a	R	usual.	usual.
241	L	usual.	P. Circumfl. ascends from Super. Prof.
242	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
243	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
247	R	usual.	usual.
248	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
249	R	usual.	Subscap., a Thoracic br. and P. Circumfl. arise by one trunk.
	L	usual.	Subscap., P. Circumfl. and part of Super. Prof. arise by one trunk.
250	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	Subscap. gives a Thoracic br.; P. Circumfl. ascends from Super. Prof.
251	R	usual.	nearly usual.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
252	R	is crossed by an additional head of median nerve higher than the usual crossing.	Subscap. arises in two parts. Dorsalis Scap. is a separate br. of Axillary. Both Circumfl. arise by one trunk.
	L	divides into two brs.; is not crossed by nerves.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is embraced by the nerves.
253	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	usual.	usual.
254	R	usual.	nearly usual.
	L	is crossed by nerves in usual situation, and again opp. lat. dorsi m.	Both Circumfl. arise by one trunk.
255	R	is accompanied at each side by heads of median n., which do not unite until the artery becomes Brachial.	Subscap. and P. Circumfl. arise by one trunk. Radial is given off at the end of Axillary.

No.	Side of the Body.	Trunk.	Branches.
	L	usual.	Subscap. arises in two parts. Dorsalis Scap. is a separate br. of Axillary. There are two A. Circumfl. brs., one being from P. Circumfl., which gives also Super. Prof.
255a	R	usual.	
	L	usual.	nearly usual.
256	L	usual.	P. Circumfl. ascends from Super. Prof.
257	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
258	L	usual.	usual.
259	R	The nerves cross behind the Axillary artery.	Subscap. and both Circumfl. arise by one trunk. Both Prof. and part of Anastomotic are given by one trunk, which arises opp. the upper part of lat. dorsi m.
260	R	usual.	Subscap. and P. Circumfl. arise by one trunk. Super. Prof. arises opp. upper part of lat. dorsi m.
261	L	divides into two brs. nearly opp. coracoid process.	gives Radial a little below coracoid process and both Prof.
262	R	is crossed twice by nerves.	Subscap. gives a Thoracic br. Both Circumfl. arise by one trunk.
	L	usual.	Subscap. arises higher than usual, and gives a Thoracic br.
264	R	usual.	usual.
265	R	usual.	Subscap. gives P. Circumfl., and, a little lower down, the Super. Prof. also.
266	R	is not crossed by nerves.	
267	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
268	R	usual.	Subscap. rises higher than usual, and gives a Thoracic br. and P. Circumfl.
	L	usual.	Subscap. and P. Circumfl. arise by one trunk.
269	R	is crossed by nerves as usual, and lower down by a br. of ext. cutaneous n., which joins median.	P. Circumfl. ascends from Super. Prof.

No.	Side of the Body.	Trunk.	Branches.
	L	usual.	usual.
271	R	usual.	P. Circumfl. ascends from Super. Prof.
	L	usual.	P. Circumfl. ascends from Super. Prof.
272	L	usual.	usual.
274	R	usual.	Subscap. arises by two separate brs. (Dorsalis Scap. is a distinct br. of Axillary.) Both Circumfl. arise by one trunk.
275	R	is not crossed by nerves.	usual.
	L	usual.	usual.
277	R	usual.	usual.
278	R	usual.	Subscap. and P. Circumfl. arise by one trunk.
	L	divides into two brs.	gives Radial.
279	L	usual.	usual.
282	L	usual.	usual.
283	R	usual.	Subscap. arises by two distinct brs. (Dorsalis Scap. is a separate br. of Axillary.)
	L	usual.	usual.
284	R	usual.	Subscap. arises higher than usual, and gives P. Circumfl.
	L	usual.	Subscap. arises higher than usual, and gives P. Circumfl.
289	R	usual.	usual.
	L	usual.	usual.
290	R	divides into two brs.; is not crossed by nerves as usual.	Subscap., both Circumfl. and both Prof. arise by one trunk, which is embraced by the nerves.
	L	divides into two brs.	Ulnar arises from Axillary, and is an unusually slender br.
292a	R	divides into two brs.	Radial arises opp. coracoid process of scapula.
293b	R	divides into two brs.	Radial is given from Axillary.

The word "usual" in the foregoing table, applied to the trunk of the Axillary artery is intended to signify that the vessel was a single trunk, and that it was surrounded by the nerves of the brachial plexus—one or both the roots of the median nerve crossing in front of it.

Applied to the branches, the same word implies that they were given separately from the trunk; that the Thoracic branches were the first offsets; that the Subscapular arose at the lower margin of the Subscapular muscle, and the two Circumflex immediately after.

ABSTRACT OF THE TABLE,

SO FAR AS REGARDS THE TRUNK OF THE AXILLARY ARTERY.

	CASES	
The artery had the usual disposition, Right side	239	
Left	205	
		444
It was not surrounded or crossed by the nerves of the brachial plexus, Right side	16	
Left	13	
		29
was crossed by branches of the nerves in two places, Right side	8	
Left	9	
		17
" " in three places, Right side	1	
Left	0	
		1
The artery gave a large unusual branch, or divided into two branches, Right side	25	
Left	26	
		51

The unusual branch referred to was the Radial, Right side	8		
Left	7		
		15	
the Ulnar, Right side	1		
Left	6		
		7	
the Interosseous, Right side.	1		
Left.	0		
		1	
a trunk common to several of the branches of the Axillary and the Brachial arteries, Right side	15		
Left.	13	28	
			51

Examples of a "Vas Aberrans" were found, Right side	2	
Left	4	
		6

Several instances of branches taking origin from the Axillary, which are ordinarily derived from other sources, are not included in the abstract of the table:—e. g. the Supra-Scapular, Dorsalis Scapulæ, Superior Profunda, and others. These cases will be referred to in the observations on the branches individually.

The statements contained in the second column of the table, that occupied with the branches, will be made use of when these are severally under consideration.

EXPLANATION OF PLATE XXVI.

This plate is intended to show the axillary and the brachial arteries of the right side, with their branches. The body from which the drawing was taken was placed in the sitting posture—the arm extended and supported on a table ; and it was elevated in such a way, that the part represented was nearly on a level with the eye of the observer.

The dissection consisted in the removal of the integuments, the fascia, the veins, and small nerves, from the thorax and the arm, together with the excision of a part of the larger and the smaller pectoral muscles.

a Clavicle.
b Greater pectoral muscle.
b† Smaller pectoral.
c Subclavius.
d Serratus magnus.
e Latissimus dorsi.
e† Teres major.
f Subscapular.
g Deltoid.
h Coraco-brachialis.
h† Coracoid process of the scapula.
i Biceps muscle.
k Triceps.
l Brachialis anticus.
m Intermuscular septum.
n Internal condyle of the humerus.
o Tendinous expansion of the biceps muscle.
p Long supinator muscle.

THE ARTERIES.

1. Axillary.
2. Brachial.
3. Acromial thoracic. From it a large branch is directed inwards to the side of the thorax (ar. thoracica suprema), and another downwards to the shoulder between the deltoid and the greater pectoral muscles (ar. thoracica humeraria).
4. Two small branches (ar. thoracica alares ?)
5. A large branch to the thorax (ar. thoracica longa).
6. Subscapular.
6†. Dorsal branch of the last-named (ar. dorsalis scapulæ).
7. Posterior circumflex.
7†. Anterior circumflex.
8. Superior profunda.
9. Inferior profunda (of larger size than usual).
10. Anastomotic (this branch is generally of smaller size than here represented).

NERVES.

11. Musculo-cutaneous — External cutaneous.
12. Median.
13. Ulnar.
14. Musculo-spiral.—A considerable portion of this nerve was removed; the lower part is seen in company with the "superior profunda" artery.

EXPLANATION OF PLATE XXVII.

The axillary and brachial divisions of the artery of the right upper extremity, are seen in this drawing to the same extent as in the preceding, and by a similar mode of dissection. But the veins, the lymphatic glands, a portion of the fascia, and some additional nerves, have been left in connexion with the arteries. While the drawing was being made, the body was somewhat lower than that of which the twenty-sixth plate is a representation; and the greater extent to which the shoulder is seen here, as well as some other slight differences observable in the position of the parts, are owing to this circumstance.

a Clavicle.
b Greater pectoral muscle.
c Smallar pectoral.
d Latissimus dorsi.
e Coraco-brachialis.
f Deltoid.
g Biceps.
h Triceps.
k Fascia.

ARTERIES.

1. Axillary.
2. Brachial.
3. Acromial thoracic.
4. Subscapular.

VEINS.

5. Axillary.
6. "Venæ comites" of the brachial artery.
7. Cephalic.
8. Basilic.
9. Median basilic.
10. Median cephalic.

NERVES.

11. Median.
12. Musculo-cutaneous — External cutaneous.
13. Ulnar.
14. Internal cutaneous.
15. Smaller internal cutaneous — "nerv. cutaneus minor internus vel ulnaris" (Wrisberg*).
†. Lymphatic glands.

* This nerve is a distinct branch of the brachial plexus. The first clear account of it was given by Klint, Wrisberg's pupil, in a dissertation on the nerves of the arm, written under the guidance of his master (solertissimus et fidelissimus præceptor). Of the nerve under observation, he says, "Cum nervo cubitali connexus est, ex eodemque pariter originem capit, uti cutaneus secundus seu internus plerorumque autorum, tertius nervus cutaneus verus et constans ab aliis prætervisus, ab ill. Wrisbergio 'cutaneus minor internus vel cubitalis' dicitur." After mentioning the names of several anatomists who had overlooked this nerve, he continues, "Visum nobis interim est, egregium Vieussenium, cujus labor pro ea ætate stupendam industriam et diligentiam prodit, paucis hunc nervum tetigisse."

Iac. Jo. Klint—"De nervis brachii." Cap. 5, § 18.—Gottingæ 1784.

EXPLANATION OF PLATE XXVIII.

The integuments and the fascia, with some cellular substance, and fat being removed, the bloodvessels, the nerves, and lymphatic glands of the axilla are seen, together with the muscles which bound the axillary space.

a Greater pectoral muscle.
b Smaller pectoral.
c Latissimus dorsi.
d Serratus magnus.
e Coraco-brachialis.

ARTERIES.

1. Axillary.
2. Subscapular.
3. A large branch of one of the thoracic arteries.

VEINS.

4. Axillary.
5. A long venous branch extending from the side of the thorax to the axillary vein.
6. Subscapular.

NERVES.

7. Musculo-cutaneous — External cutaneous.
8. Median.
9. Ulnar.
10. Musculo-spiral—drawn out from under the artery.
11. Internal cutaneous.
12. Smaller internal cutaneous—"n. cutaneus minor internus vel ulnaris" (Wrisberg).
13. Two Intercosto-humeral, cut.
14. The nerve of the serratus magnus muscle — posterior thoracic— "external respiratory" of Bell.
15. One of the subscapular nerves—given to the teres major and the latissimus dorsi muscles.

Three of the middle cutaneous branches of the dorsal nerves are seen directed upwards on the serratus magnus and cut. The distribution of these nerves is briefly as follows:—Each divides into two branches, one of which is inclined forwards, and the other in the opposite direction. The anterior branches of those which escape by the second and the third intercostal spaces, turn forward over the margin of the pectoral muscle, and the posterior branches are those named intercosto-humeral; the latter are marked (13) in the plate.

EXPLANATION OF PLATE XXIX.

The back part of the scapula and of the arm are represented in the first figure. The deltoid muscle was partly separated from its connexion to the spine of the scapula, in order to expose the posterior circumflex artery and the circumflex nerve.

The fore arm being supported by a string, was seen and has been represented considerably fore-shortened.

The second figure of the plate shows the arteries, which ramify on the ventral surface of the scapula. These small vessels are derived from the supra-scapular, the posterior scapular, and the sub-scapular arteries. They are much smaller than those which ramify on the opposite surface of the same bone. See plate 19.

a Spine of the scapula.
b Supra spinatus muscle.
c Infra spinatus.
d Teres minor.
e Teres major.
f A portion of the latissimus dorsi.
f † Tendon of the latissimus dorsi.
g Triceps.
h Tendon of the subscapular.
i Long head of the biceps.
k Head of the humerus.
l Deltoid muscle.
l † Part of the deltoid cut and turned forwards; the head of the humerus and the circumflex artery and nerve are thereby exposed.

ARTERIES.

1. Axillary.
2. Subscapular.
2†. The dorsal branch of that artery.
2‡. A branch ramifying in the subscapular fossa.
3. Posterior circumflex.
4. Anterior circumflex.
5. A branch of the superior profunda.
6. Supra scapular.
7. Posterior scapular. Small branches of this artery are given to the dorsal as well as the ventral surface of the scapula.

NERVES.

8. Circumflex distributing large branches to the deltoid muscle; other branches are given to the infra spinatus muscle.
9. External cutaneous branch of the musculo-spiral.

EXPLANATION OF PLATE XXX.

In this plate are represented some of the peculiarities which occur in the branches of the axillary artery.

a Subscapular muscle.
b Part of the latissimus dorsi.
c A small part of the serratus magnus —on it lies a portion of the posterior scapular artery.
d Coracoid process.
e Deltoid muscle.
f Biceps muscle.
g Triceps.
h Coraco-brachialis.
k The outer end of the greater pectoral.
k† The outer end of the smaller pectoral.
l Internal condyle of the humerus.

ARTERIES.

1. Axillary.
2. Brachial.
3. Subscapular.
3†. A trunk which gives origin to the sub-scapular, both the circumflex and both the profunda arteries.
4. Anterior circumflex.
4†. A trunk giving origin to the anterior circumflex, the posterior circumflex, and the superior profunda branches.
5. Posterior circumflex.
6. Superior profunda.
7. Inferior profunda.
8. Anastomotic.
9. Radial.
10. Ulnar.

NERVES.

11. Musculo-cutaneous — External cutaneous.
12. Median.
13. Musculo-spiral.
14. Ulnar.

In the first figure, the sub-scapular artery takes origin at some distance above its usual position, and gives branches which were distributed to the thorax. The anterior and the posterior circumflex, with the superior profunda, arise from one trunk.

In the second figure, the axillary artery divides into two branches of nearly equal size; one descends to supply the usual branches to the fore-arm, and, in its course, gives very few offsets to the upper arm. The other division of the artery soon divides into the branches, which are usually given singly from the axillary and the brachial trunks—namely, the subscapular, both the circumflex and both the profunda; it is placed behind the former artery, and the nerves of the brachial plexus are arranged closely around it, instead of embracing the axillary artery. This disposition of the arteries is not of unfrequent occurrence.

Figure 3. In this figure, also, the axillary artery divides into two large branches. The deeper one gives, as in the preceding case, the principal branches of the shoulder and the arm, and is likewise surrounded by the nerves. The arrangement differs from that represented in the former figure chiefly in this respect, viz. that after giving the branches, the artery continues to the fore-arm, becoming the radial. This modification is very rarely met with.

EXPLANATION OF PLATE XXXI.

Some of the variations which occur in the origin and course of the radial artery are represented in this plate.

a Clavicle.
b Coracoid process of the scapula.
c Deltoid muscle.
d Head of the humerus covered by the capsular ligament.
e Coraco-brachialis muscle.
f Latissimus dorsi.
f† Greater pectoral.
g Biceps.
h Triceps.
i Brachialis-anticus.
k Inner condyle of the humerus.
l Pronator teres muscle.
m Supinator longus.
n The fibrous expansion from the tendon of the biceps muscle.
o An unusual tendinous cord of considerable thickness, which was connected with the tendon of the biceps on the outer side, and with the intermuscular septum on the inner side of the arm. It lay beneath the fascia, and crossed the vessels and nerves.

ARTERIES.

1. Axillary.
2. Brachial.
3. Subscapular.
4. Posterior circumflex.
4.† Anterior circumflex.
5. Radial.
5.† Radial below the bend of the elbow.
6. Superior profunda.
7. Anastomotic.
8. Ulnar.
9. Radial recurrent.

NERVES.

10. Musculo-cutaneous,—external-cutaneous.
11. Median.
12. Circumflex.
13. Musculo-spiral.
14. Ulnar.

Figure 1. In the arm, from which this representation was taken, the radial artery arose close to the clavicle, and lay nearly over the other larger artery along the arm.

In the same figure, some peculiarities of the branches are shown. Thus, the subscapular takes its origin a considerable distance above the usual position; the posterior circumflex is given from the superior profunda, and ascends behind the tendon of the latissimus dorsi, to its usual situation; the inferior profunda is wanting, and its place is taken by the anastomotic.

Figure 2. The radial is given from the inner side of the brachial, and courses along the arm over that vessel. In the upper part of the forearm, it is somewhat further removed from the supinator longus muscle than usual.

The axillary artery is crossed by a small branch of the brachial plexus of nerves, above that which occurs in the usual position. The brachial vessels and the biceps muscle, are crossed obliquely by a tendinous cord, which extends from the long head of the muscle just named, to the intermuscular partition above the inner condyle of the humerus. The cord was rounded and more even than it is represented in the drawing. The radial recurrent artery takes origin from the larger or ulnar branch, and passes behind the tendon of the biceps muscle.

Figure 3. The radial artery is derived from the outer side of the brachial, a couple of inches above the usual situation.

EXPLANATION OF PLATE XXXII.

Some of the variations, in the place of origin of the ulnar artery, are represented in this plate.

a Coracoid process of the scapula.
b Deltoid muscle.
c Greater pectoral.
d Latissimus dorsi.
e Head of the humerus.
f Coraco-brachialis muscle.
g Biceps.
h Triceps.
i Brachialis-anticus.
k Inner condyle of the humerus.
l The fibrous expansion from the tendon of the biceps muscle.
m The fascia of the forearm.
n Flexor-carpi ulnaris muscle.
o Flexor-carpi radialis.
p Supinator longus.

ARTERIES.

1. Axillary.
2. Brachial.
3. Subscapular.
4. Posterior circumflex.
4.† Anterior circumflex.
5. Ulnar.
5.† Ulnar below the bend of the elbow.
6. Superior profunda.
7. Inferior profunda.
8. Radial.
9. Interosseous.

NERVES.

10. Median.
11. Musculo-spiral.
12. Ulnar.

Figure 1. The ulnar artery arises from the upper part of the axillary. After lying over the larger artery, as far as the middle of the arm, it inclines inwards, and is placed at some distance from that vessel, at the bend of the elbow. In the

forearm, the ulnar artery is covered immediately by the fascia. The other and larger branch (brachial) of the axillary, has the nerves disposed on it; it gives the branches to the upper arm and divides a little below the bend of the elbow, into the radial and interosseous arteries.

The subscapular artery is seen in this drawing to arise above the usual position, and to give origin to the posterior circumflex.

Figure 2. In this figure, the ulnar is given from the outer side of the brachial, and, after crossing obliquely to the inner side, it lies in the forearm, between the muscles and the fascia.

The larger artery (brachial?) furnishes the branches to the arm and to the forearm—dividing into the radial and interosseous.

Figure 3. The ulnar here is given close to the pronator teres muscle. From this situation, it is directed obliquely towards the flexor carpi ulnaris, and gains the usual position, with reference to that muscle and the ulnar nerve, at the distance of about a third from the lower end of the forearm.

EXPLANATION OF PLATE XXXIII.

This plate is intended to illustrate the variations in the place of origin of the interosseous artery.

a Clavicle.
b Coracoid process of the scapula.
c Deltoid muscle.
d Head of the humerus covered by the capsular ligament of the shoulder joint.
e Coraco-brachialis muscle.
f Tendon of the latissimus dorsi.
f† Humeral end of the greater pectoral, (the cross † appears to have been omitted from the first figure.)
g Biceps.
h Triceps.
i Brachialis anticus.
k Inner condyle of the humerus.
l Pronator teres muscle.
m Supinator longus.
n Palmaris longus.

ARTERIES.

1. Axillary.
2. Subscapular.
3. Brachial.
4. Superior profunda.
5. Interosseous.
5.† Interosseous below the elbow.
6. Inferior profunda.
7. Anastomotic.
8. Brachial, the common trunk of the radial and ulnar.
9. Radial.
9.† Radial recurrent. In figure 2, this branch is given from the interosseous.
10. Ulnar.

NERVES.

11. Musculo-cutaneous. — External-cutaneous.
11.† A branch of the musculo-cutaneous, which joins the median below the latissimus dorsi muscle.
12. Median.
13. Musculo-spiral.
14. Ulnar.

In figure 1, the interosseous arises from the axillary artery; but a more detailed description of this figure is necessary.

The main artery divides a little below the clavicle into two large branches. One of these continues in the usual course of the brachial, and divides at the bend of the elbow into the radial and ulnar arteries. The ulnar was covered by the fascia and lay, as represented in the drawing, superficially to the muscles of the forearm, with the exception of the palmaris longus, which crossed over the vessel.

The second division of the axillary artery lies deeper than the preceding, and is embraced by the nerves of the brachial plexus—in this case, a second nervous branch crosses the vessel below the axilla. This artery gives nearly all the branches usually derived from the axillary and the brachial, viz. the subscapular, both the circumflex, both the profunda and the anastomotic; and it ends as the interosseous — furnishing all the recurrent branches except the radial.

The large branch of the axillary artery supplied, therefore, the shoulder (in great part), together with the arm and the forearm.

Figure 2. The interosseous artery here arises from the brachial. After descending to the forearm, the interosseous furnished, besides its accustomed branches, the recurrent arteries, usually derived from the radial and ulnar. The last-named vessel lay between the fascia and the muscles, in its course along the forearm.

Figure 3. In this figure, the interosseous artery arises near the bend of the elbow, and the radial and ulnar take their origin at the same point. The first-named vessel was placed at its origin, behind the other two; and it furnished the same branches as the corresponding artery represented in the preceding figure, with the exception of the radial recurrent, which is seen to have its usual origin.

The brachial artery, in this case, divides into three large arteries at the same point. In the other arm of the same body, the interosseous branch arose nearly in the same place, but the radial and ulnar arteries separated one from the other, at some distance—about two inches—farther down.

EXPLANATION OF PLATE XXXIV.

In all the figures of this plate the main artery of the upper limb divides into two branches above the usual position. The branches in one case join again, and in the others they communicate by a short branch at the bend of the elbow.

a Coracoid process of the scapula.
b Deltoid muscle.
c Greater pectoral.
d Latissimus dorsi.
e Head of the humerus.
f Coraco-brachialis muscle.
g Biceps.
h Triceps.
i Brachialis anticus.
k Inner condyle of the humerus.
l Pronator-teres muscle.
m Supinator longus.

ARTERIES.

1. Axillary.
2. Brachial.
2.† } Two brachial arteries which
2.‡ } unite at the bend of the elbow.
3. Subscapular.
4. Posterior circumflex.
4.†Anterior circumflex.
5. Radial.
5.†Radial below the bend of the elbow.
6. Superior profunda.
7. Reunion of the two parts of the brachial artery.
7.' A short communicating branch between radial and ulnar.
7.†A branch still longer, uniting the same vessels.
7.‡A somewhat similar branch—but in this case taking a circuitous course round the tendon of the biceps muscle.
8. Ulnar.

NERVES.

9. Musculo-cutaneous.
10. Median.
11. Ulnar.

Figure 1. The axillary artery gives, near the clavicle, a long slender branch,* which is joined by a short transverse one at the upper part of the forearm. Having thus become larger than before, the artery follows the ordinary course of the

* This vessel was more slender than it is represented in the drawing. This fact is still observable in the preparation, No. 509.

radial. Or it may be said that the radial arises from the axillary artery, and is reinforced by the communicating artery at the elbow.

Figure 2. Two large branches, into which the brachial artery divided, are connected by a short branch at the elbow.

Figure 3. The brachial artery at its commencement divides into two branches. These re-unite and form a single trunk, which speedily gives the radial and ulnar branches in the usual way*.

Figure 4. The two arteries, into which the brachial divides (radial and ulnar), are brought into communication by a branch which pursues a circuitous course round the tendon of the biceps muscle.

EXPLANATION OF PLATE XXXV.

Various instances of "vasa aberrantia" are represented in this plate.

a Deltoid muscle.
b Latissimus dorsi.
c Greater pectoral.
d Coraco-brachialis.
e Biceps.
f Triceps.
g Brachialis anticus.
h Inner condyle of the humerus.
i Upper part of the pronator-teres muscle.
i† Lower part of the pronator-teres, turned outwards after having been divided.
k Supinator longus.
l Flexor profundus digitorum.
m Flexor carpi ulnaris.
n Flexor longus pollicis.

ARTERIES.

1. Axillary.
2. Brachial.
3. "Vas aberrans."
4. Radial.
4.† Radial recurrent.
5. Ulnar.
5.† Ulnar below the origin of the interosseous.
6. Interosseous.
6† Posterior interosseous.

NERVES.

7. Median.
8. Ulnar.

Figure 1. The unusual vessel springs from the beginning of the brachial artery, and joins the commencement of the radial.

* I have been favoured by Professor Clark with a drawing of a case very similar to this. The preparation from which it was taken is in the Macartney collection in the anatomical museum of the University of Cambridge.

Figure 2. The "vas aberrans" arises from the brachial, farther down than in the preceding case, and joins the recurrent radial, which is here derived from the ulnar artery.

Figure 3. The "vas aberrans" joins the radial. The latter has an unusual course behind the tendon of the biceps muscle. The arrangement may be stated to be this: namely, that the radial artery has a double origin, one (the vas aberrans) from the axillary, the other from the brachial.

Figure 4. The brachial artery here continues undivided much lower than usual, and gives, at the same time, the radial, the ulnar, and both the interosseous arteries.

The "vas aberrans" was given by the axillary, and, as seen in the drawing, it joined the radial below the middle of the arm. It is obvious that in this case, as in the foregoing, the manner of considering and describing the artery might be differently stated.

In each of the cases, delineated in the first, the third, and the fourth figures, the "vas aberrans" lay in a greater or less degree in front of the brachial artery; but in that represented in the second figure, it was behind that vessel.

EXPLANATION OF PLATE XXXVI.

a Biceps muscle.
b Triceps.
c Brachialis anticus.
c† An osseous projection from the humerus.
d Inner condyle of the humerus.
e Pronator teres muscle.
e† Part of the pronator teres turned outwards.
f The superficial pronator and flexor muscles cut.
g Flexor carpi ulnaris.
h Flexor digitorum profundus.
i Supinator longus.
k Fascia of the arm and forearm.
k† Fibrous expansion of the biceps.

THE ARTERIES.

1. Brachial.
2. Ulnar arising above the elbow.
2†. The same artery below the elbow.
3. Radial-interosseous trunk (Brachial ?)
3†. Radial.
3‡. Communicating branch between the radial and the ulnar.
4. Interosseous.

NERVES.

5. Median.
6. Ulnar.

Figures 1 and 2.—These may be considered supplemental to the thirty-second plate, in which peculiarities of the ulnar artery are represented. In one of the figures now under observation, the ulnar artery, after arising from the brachial, is placed over the fascia of the forearm,—immediately under the common integument. In the other figure, on the contrary, the vessel lies under the superficial muscles of the forearm. The recurrent ulnar branches were derived in the latter case, as well as in the former, from the interosseous artery.

Figure 3.—The brachial artery, instead of being directed along the biceps muscle, to its usual position at the bend of the elbow, inclines inwards on the intermuscular septum to the origin of the pronator teres, and then, taking an opposite course (outwards) under the upper margin of that muscle, divides about the usual situation. The artery is accompanied in this unusual course by the median nerve, and, at the point at which the direction is changed, it is seen to turn round a bony prominence (c†). This projects from the humerus by the side

of the vessel, and gives attachment to a fibrous band, which crosses over the artery and the nerve.

Figure 4.—One of two branches into which the brachial artery is divided near its beginning, deviates together with the median nerve somewhat in the same manner as the single vessel in the preceding case. They pass through the intermuscular septum immediately above the margin of the pronator teres muscle, and in their course outwards to the middle of the bend of the elbow are partially covered by the muscle. The two vessels into which the brachial artery divides are connected by a thick transverse branch at the upper part of the forearm.

In the cases represented in the last two figures, the pronator teres is broader than usual at its origin.

EXPLANATION OF PLATE XXXVII.

a Deltoid muscle.
a† Head of the humerus.
b Greater pectoral muscle.
c Coraco-brachialis.
c† Coracoid process of the scapula.
d Latissimus dorsi (muscle).
e Biceps.
e′ In figure 5, an unusual bundle of muscular fibres extending over the brachial artery from the biceps muscle to the intermuscular septum. (The dash (′) appears to have been omitted by the printer.)
e† Fibrous expansion from the tendon of the biceps.
f Triceps.
g Brachialis anticus.
g† A layer of the brachialis anticus covering the larger of two branches into which the brachial artery is divided, together with the median nerve.
h Inner condyle of the humerus.
i Supinator longus (muscle).
k Pronator teres.
k† Pronator teres—presenting the peculiarity of being much broader than usual at its upper end.
l Superficial flexor muscles cut.
m Flexor digitorum profundus.
n Fascia.

ARTERIES.

1. Axillary.
2. Brachial.
2†. The larger of the two branches into which the brachial divides—the common trunk of the ulnar and interosseous.
3. Ulnar—below the origin of the interosseous.
4. Radial.
5. Interosseous.

NERVES.

6. Median.
6†. Roots of the median.
7. Ulnar.
8. Musculo-cutaneous — External cutaneous.

Figures 1 and 2 contain modifications of that peculiarity of the brachial artery of which examples are given in the last two figures of the preceding plate. In both the cases here represented the smaller division (radial) of the main artery follows the usual course of the brachial on the inner side of the biceps muscle, while the larger vessel, the common trunk of the ulnar and interosseous arteries (brachial ?), together with the median nerve, is placed at some distance to the inner side,—to within a couple of inches of the inner condyle of the humerus; at this point it becomes covered by a broad pronator teres, and is directed to the middle of the bend of the elbow beneath that muscle.

The difference between the two cases consists mainly in the difference of the place at which the principal artery divides.

Figures 3, 4, and 5, contain representations of some peculiarities of the muscles connected with the brachial artery. In the first two the brachial artery and the median nerve are seen to be covered by a thin layer of the brachialis anticus muscle, and in each the radial artery occurs in the ordinary position of the brachial. Figure 4 is from the arm of a person who had suffered amputation some years before death.

The fifth figure shows the brachial artery concealed for a short space by a thick bundle of muscular fibres, which extends from the biceps to the intermuscular septum on the inner side of the arm. This may be considered to constitute a second insertion of the biceps. The same figure affords an example of junction of the roots of the median nerve, taking place further down than usual.

THE AXILLARY ARTERIES.

The ordinary disposition of the axillary artery is represented in the twenty-sixth plate, and its connexions with nerves and veins are shown in the twenty-seventh and twenty-eighth plates. The observations on this artery will, as in the case of other arteries, be confined to the deviations from the standard or usual condition.

The arrangement, which will be regarded as the usual one, has been already referred to; see the abstract of the table at page 210. The deviation of most practical importance is that in which the vessel, instead of continuing as an undivided

trunk, and giving, at intervals, offsets to the parts in its neighbourhood, divides into two large branches,—or, as it may be expressed, sends off a branch of much larger size than usual. The table contains the record of 506 cases,—270 being of the right side, and 236 of the left. In 51 the axillary was observed to divide into two such branches, giving a proportion of about one in ten.

In a majority (28) of the cases last referred to, the unusual or second branch was fully equal in thickness to the continued (brachial) trunk, and generally gave origin to the subscapular, both the circumflex, and both the profunda branches. (See the table, p. 230.) So that the peculiarity consisted in the fact of the vessels just named being given from a common origin, in place of arising in succession and at greater or less intervals from the axillary and brachial divisions of the main artery. This condition of the branches is represented in plate 30, figure 2.

In the remainder (23) of the deviations under consideration, one of the arteries of the forearm,—usually given near the elbow,—was found to spring from the axillary. These cases were distributed as follows :—

The Radial arose from the Axillary in	15	—1 in about	$33\frac{3}{4}$
Ulnar . . . . in	7	—1 in —	$72\frac{2}{7}$
Interosseous . . . in	1	— in —	506

Besides the foregoing unusual branches,—which are of so large size that the main artery may be regarded as dividing into two parts where they arise—and independently of its proper or usual branches to be noticed presently,—the axillary occasionally gives origin to small branches, ordinarily found to emanate from other sources. The following have been noted in the table :—

A. dorsalis scapulæ (usually a branch of the subscapular).	Right side	7
	Left	3
		—10

Arteries usually derived from the subclavian found to arise from the axillary.

Internal Mammary—see plate 24, figure 4. (Mention of this has been accidentally omitted from the table.)		1
Supra-Scapular—see plate 24, figure 7 . . .	Right .	1
	Left . .	1
		—2
Supra-Scapular and Posterior Scapular by one trunk.	Right .	1

Arteries usually given from the brachial found to arise from the axillary.

Superior Profunda	Right side	3
	Left .	1
		—4
Superior Profunda and Inferior profunda by one trunk	Left .	1
Both Profunda and Anastomotic by one trunk . .	Left .	1
Examples of "Vasa Aberrantia" occurred in . . .	Right .	2
	Left .	4
		—6

To those instances of the presence of unusual branches will be added one of the absence from the axillary of a branch usually derived from it.

The Posterior Circumflex did not arise from the Axillary, in or from one of its branches. (See remarks on this branch)	Right .	38
	Left .	33
		—71

BRANCHES OF THE AXILLARY ARTERIES.

The axillary, like other arteries, distribute branches to the parts in their immediate neighbourhood. Exclusively of several of small size given to the nerves and other structures, the branches consist of the external thoracic, the subscapular, and two circumflex.

THE EXTERNAL THORACIC ARTERIES.

The arteries known under this name differ so much in number and size, and so little of practical importance attaches to these differences, that I have not thought it necessary to make any detailed series of observations on the arrangement which they present in various cases.

Haller described four—naming them, thoracica prima v. suprema : thoracica altera major sive longior : thoracica acromialis v. humeraria : alaris (ultima thoracicarum) ; but he admits that there is really in nature much variety as to these vessels*. Some anatomists have adopted this arrange-

* "Eadem etiam in sede, secundum infrascapularem eundo, educit quatuor sibi vicinas arterias Thoracicas externas, quas sollicite describemus, supremam, et longiorem, Thoracicam humerariam, alarem. *Alias* tres sunt, et humeralis eumdem truncum cum majori thoracica habet. *Alias* prius quam reliquæ Acromialis sive Thoracica humeralis provenit. *Alias* vidi, Thoracicam primam, acromialem et Scapularem inferiorem solas adfuisse, a qua Thoracica longior oriretur, et non rarum est, deficere alarem. *Alias*, et nunc maxime coram, sex omnino arterias dignas vidi,

ment *, while others admit the existence of three †, or but two ‡ external thoracic branches, as requiring to have names assigned to them. A few remarks may be made on each of the branches recognised by Haller.

The first or highest thoracic branch § is perhaps as frequently connected with that next named as it is separate from it. It was so disposed in the cases represented in plates 26 and 27.

The acromial thoracic, or humeral thoracic ‖.—The course which its principal branches take will sufficiently account for the names applied to this artery. It is the most constant of the external thoracic arteries, and often gives rise to one or more of them, most frequently to the branch placed first in the series; see plates 26 and 27.

The long thoracic, or external mammary ¶, is not unfrequently derived from the acromial artery, and occasionally arises in common with the subscapular, especially when the latter takes origin higher than usual. Meckel regards their connexion as so much the most frequent condition, that he describes the

quæ Thoracicæ externæ dicerentur. * * * * Cæterum scriptores omnes, etiam nuperrimi, a nostris observationibus in his thoracicis differunt, et oportet maximam varietatem naturæ esse."—Icones, &c. Fascic. vi. p. 10.

" Postquam arteria subclavia in arteriam axillarem transiit, præter parvos illos ramulos ad nervos brachiales, &c. * * * tres, quatuor vel sex edit arterias thoracicas externas."—Sœmmering. De Corp. h. fabr. t. v. p. 186.

* In describing these arteries, Sœmmering (loc. citat.): J. Bell (The Anat. of the Human Body, Ed. 7, vol. 2, p. 169): Fyfe (A Compend. of the Anatomy, &c., Ed. 4, vol. 3, p. 47) and Harrison (The Surg. Anat. of the Arteries, vol. 1, p. 145, et seq.) appear to adopt the nomenclature and arrangement of Haller.

† Bichat (Anat. Descript. nouv. ed. t. 4, p. 229) omits the " thoracica alaris," and in other respects follows the arrangement just referred to—recognising, therefore, three thoracic arteries. This modification is adopted by Boyer (Traité Compl. &c. 4e. Ed. t. 3, p. 82). H. Cloquet, (Tr. d'Anat. Descript. 5e. Ed. t. 2, p. 466), and Hildebrandt and Weber (Handbuch der Anat. des Menschen, 4e Ausgabe, 3. B., S. 210).

‡ J. F. Meckel (Handbuch der Menschlich. Anat, 3. B., S. 162) omits the alar branch, and connects the long thoracic with the subscapular. Thus, independently of variations in the thoracic arteries, which, he says, sometimes augment their number to four or five, Meckel admits the existence of but two, viz. the " thor. suprema" and the " thor. acromialis."

Cruveilhier likewise describes but two thoracic branches. He omits the alar artery, like the anatomists last referred to, and considers the " thor. suprema " and " thor. acromalis " as one branch; recognising, therefore, it and the long thoracic as separate offsets of the axillary artery.—Anat. Descript. t. 3e., p. 160.

§ " Thoracica suprema," sive " prima."—Haller. " Thor. ext. suprema, sive prima, sive minor, s. mammaria externa, vulgo prima."—Sœmmering. " Artère thoracique externo supérieure."—Bichat. " Die obere oder erste äussere Brustpulsader,"—" die kleinere äussere Brustpulsader."—J. F. Meckel.

‖ " Thoracica humeraria quam ab acromio voco Acromialem," &c.—Haller.

¶ " Thoracica altera major, sive longior." " Hanc etiam suspicor esse Heisteri mammariam externam."— Haller. " Artère thoracique externe inférieure."—Bichat.

long thoracic as a branch of the subscapular *. According to my observation, the arteries are generally independent one of the other.

The alar thoracic †.—This branch, should any such be separately given from the axillary, is destined to the axillary glands. Its existence is admitted by those writers who follow Haller‡ in their description of the arteries, and is not allowed by others §. I believe it to be generally wanting, and that the lymphatic glands of the axilla are supplied from several sources—the thoracic and the subscapular arteries.

Lastly, the number of the branches that may be considered the external thoracic is most commonly two or three, but occasionally it is greater, and it is found, rarely however, to be even less. In the table ten cases are mentioned in which but one external thoracic artery arose from the axillary, and from it branches were given in about the usual number. Four of the examples of this diminution of the number occurred on the right, and six on the left side.

OF THE REMAINING BRANCHES, NAMELY, THE SUBSCAPULAR, THE ANTERIOR CIRCUMFLEX, AND THE POSTERIOR CIRCUMFLEX.

The peculiarities noticed with respect to these arteries have been so numerous, that it seems best to place them in a tabular form. The condition implied by the term "usual" as applied to them will, in the first place, be briefly stated for each branch.

The Subscapular—Infrascapular ‖. The subscapular artery usually arises opposite the lower margin of the subscapular muscle, and distributes branches to the muscles in the neighbourhood, viz. subscapularis, teres major, latissimus dorsi,

* "Die lange äussere Brustpulsader ist so allgemein ein Zweig der Unterschulterblattpulsader, das sie gar nicht als eigner Ast bescreiben werden sollte."—J. F. Meckel. loc. cit. § 1407.

† "Alaris, ultima Thoracicarum." "Ad glandulas cæterum alares numerosos ramos dat."—Haller. "Arteria thoracica profunda, sive quarta, sive alaris, sive axillaris glandulosa."—Sœmmering.

‡ Ante, p. 228, note *.

§ Page 228, notes † & ‡.

‖ "Scapularem inferiorem aut infrascapularem voco," Haller. "Arteria propria subscapularis, sive scapularis inferior, sive infrascapularis," Sœmmering.—"Unterschulterblattpulsader,—A. scapularis communis," J. F. Meckel.

and serratus magnus, as well as to the lymphatic glands of the axilla. It gives several branches, of which two especially require notice. These ramify, one on the dorsal, the other on the ventral surface of the scapula, between the bone and the muscles; the former is named the dorsal branch—a. dorsalis scapulæ—circumflexa scapulæ.—They are of unequal size, the dorsal artery being much the larger. The subscapular artery and its connexions and branches are represented in plates 19, 26, 28, and 29. Its peculiarities will be associated with those of the circumflex arteries.

The anterior circumflex and the posterior circumflex. These branches arise close to the subscapular, and often opposite one to the other. The posterior is considerably the larger, and is accompanied in its distribution by the circumflex nerve; see plates 26 and 29.

The entire number of the cases noted in the table—
both sides included—is 501

The Branches are marked "usual" in . . . . { Right side 111 / Left — 106 } —— 217

THE PECULIARITIES.

Subscapular gives Supra-scapular—plate 25, figure 1 . . 1

Subscap. arises in two parts—Dorsalis Scapulæ being a separate branch of the Axillary . . . . . { R. 17 / L. 7 } —24

Subscap. gives a considerable Thoracic branch. (Plate 30, figure 1) . . . . . { R. 10 / L. 6 } —16

Subscap. gives a large Thoracic br. and Post. Circumfl., or they arise by one trunk . . . . . { R. 2 / L. 2 } — 4

Subscap. and P. Circumfl. arise by one trunk . . . { R. 43 / L. 24 } —67

Subscap., a Thor. br., and both Circumfl., arise by one trunk { R. 1 / L. 1 } — 2

Subscap. and both Circumfl. arise by one trunk . . . { R. 2 / L. 2 } — 4

Subscap., P. Circumfl., and Super Prof. arise by one trunk { R. 1 / L. 1 } — 2

Subscap., both Circumfl., and Super Prof. arise by one trunk { R. 1 / L. 6 } — 7

Subscap., P. Circumfl., and both Prof. arise by one trunk { R. / L. 1 } — 1

Subscap., both Circumfl., and both Prof. arise by one trunk—plate 30, figure 2 . . . . . R. 10, L. 8 —18

Subscap., both Circumfl., both Prof. and Anastom. arise by one trunk . . . . . R. 1, L. 1 — 2

Subscap., both Circumfl., both Prof. and Inteross. arise by one trunk—Plate 33, figure 1. . . . . R. 1, L. — 1

Subscap , both Circumfl., both Prof. and Radial arise by one trunk—plate 30, figure 3. This case is not included in the table . . . . . R. , L. — 1

In the foregoing cases the common trunk of the branches had the usual place of origin of the Subscapular artery, which might be considered to have given off the others ; except, however, when a Thoracic artery of considerable size was one of the branches : in which case the common trunk was for the most part placed above its usual position.

Post. Circumfl. gave origin to Dorsalis Scap. . . . R. 5, L. 3 — 8

" " to Super. Prof. . . . . R. 8, L. 6 —14

" " to both Prof. . . . . R. 1, L. — 1

" " to Dorsalis Scap., and both Prof.,—or these brs. arose by a common trunk . . . . . R. 1, L. — 1

Anter Circumfl. and Post. Circumfl. arose from a common trunk . . . . . R. 14, L. 15 —29

Both Circumfl. and Dorsal Scap. from a common trunk . . R. 1, L. 1 — 2

Both Circumfl., Dorsal Scap. and Super. Prof. from a common trunk . . . . . R. 2, L. — 2

Both Circumfl. and Super. Prof. from a common trunk—plate 30, figure 1. R. 3, L. 2 — 5

Both Circumfl. and both Prof. from a common trunk . . R. 2, L. — 2

In the cases here referred to, the trunk common to the Posterior Circumflex and other branches had the usual position of the Posterior Circumflex when a single artery, and it may therefore be said to have given off the branches.

Post. Circumfl. arose from the Brachial artery . . . R. , L. 2 — 2

" from the Super. Prof.,—or both emanated from a common trunk which had the usual place of origin of the Super. Prof. . . . . R. 37, L. 30 —67

In the cases in which the Post. Circumfl. had this unusual origin, it ascended to its destination behind the tendons of the latissimus dorsi and teres major muscles.

The Anterior and the Posterior Circumflex arteries were in some instances found to be double—the latter most frequently so.

THE VEINS, THE NERVES, AND THE MUSCLES IN CONNEXION WITH THE AXILLARY ARTERIES.

The veins.—The position which the veins usually have with respect to the axillary artery is shown in plates 27 and 28.

The axillary vein.—I have not noticed any peculiarity of this vein requiring mention, in consequence of an influence it would be likely to exert on the performance of a surgical operation. An example of a double axillary and subclavian vein, observed by Morgagni, has been referred to in a preceding part of this work (page 182). I have repeatedly seen the axillary vein perforated by a branch of the internal cutaneous nerve. May not the condition of the vein, in this case, be regarded as a transition to that noticed by Morgagni?

The *cephalic vein* was found in one instance to cross the clavicle, and end in the subclavian instead of the axillary vein. This case has likewise been previously noticed,—page 183, and plate 25, figure 5.

Reference may here be made to a peculiarity of another vein, the external jugular, which in one instance crossed the clavicle from above, and had therefore some connexion with the commencement of the axillary artery; see ante, page 183, and plate 25, figure 4.

The nerves.—The ordinary disposition of the nerves will be found represented in the twenty-sixth and other plates. The peculiarities consist chiefly in the number of the branches which cross in front of the artery being increased from one to two, or to three. Examples of the artery being crossed by the nerves (roots of the median) at two points, are noticed in the table to have been observed in seventeen cases—eight being on the right side, and nine on the left; see plate 31, figure 2. It was occasionally seen to be crossed successively by three such nerves; only one instance, however, is recorded in the table.

It is remarkable that when the axillary artery gives a large muscular trunk, from which several of the branches usually given singly from the axillary and the brachial arteries arise, the nerves are disposed around this unusual offset instead of the main vessel. This is recorded in the table of twenty-eight

cases, fifteen being on the right side, thirteen on the left. And it is illustrated in plate 33, figure 1, and in plate 30, figures 1 and 2.

The heads of the median nerve are mentioned as having crossed the brachial in place of the axillary artery in two cases.

The muscles.—I have in several instances observed the lower part of the axilla crossed by a broad band of muscle, reaching from the latissimus dorsi, with which its fibres were continuous, to the fascia covering the biceps, or to the tendon of the larger pectoral muscle.

I have seen a few examples of a deficiency of the lower part of the larger pectoral muscle; and during the last winter a body came under my notice in which the lower half of the costal portion of the muscle was wanting, and the smaller pectoral lay exposed to a considerable extent after the integuments had been removed. But the deficiency of muscular fibres in these cases not approaching the situation of the axillary vessels, did not in any degree alter the accessibility of the artery. They are noticed in this place because they may be considered as a transition to a remarkable one lately observed.

Of the case last referred to, it is stated that on the left side of the body no part of the greater pectoral muscle was present except that derived from the clavicle; that the smaller pectoral muscle was altogether wanting; and that there existed but a small portion of the serratus magnus—those fibres only which arise from the first two ribs. The position of the axillary vessels with reference to the free margin of the pectoral muscle is not mentioned in the report, and they are altogether omitted in the sketch accompanying it. It is probable that the vessels might have been exposed by turning the muscle slightly aside *.

* The observation was made on the body of a male, "respecting whom no history could be obtained; except that it was remarked he could never draw his left arm across the chest; and that when asked to give his left hand, in order that the pulse might be felt by any one standing on his right side, he invariably turned (his body?) round to do so." The body generally "was spare and delicate. The muscles of the right arm were much more developed than those of the left," &c.

"Deficiency of the pectoral muscles reported by Mr. Alfred Poland," in Guy's Hospital Reports, No. xii. p. 191—London, 1841.

BRACHIAL ARTERIES.

The abbreviations adopted in the following table have been made in the same manner as those in the foregoing tables.

The Brachial artery is said to be "usual" where it was a single vessel as far as the bifurcation at the bend of the elbow : situated along the inner side of the biceps muscle : uncovered by muscle : and crossed by the median nerve—this being in front of the vessel.

Where the branches are stated to have been "usual," it is implied that, besides several muscular branches directed outwards or backwards, there were three of greater length and usually of greater thickness, given from the inner side of the trunk—namely, the Superior Profunda, the Inferior Profunda, and the Anastomotica magna. That these arose in the order they are here named—the first being given close to the origin of the Brachial artery : the last a little above the inner condyle of the humerus : the third branch intervening between the other two, but situated nearer to the former than the latter.

The statement that the trunk was "as two branches" means that the place of the usually single Brachial artery was occupied by two vessels into which the Axillary had divided.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
1	R	usual.	usual.
	L	usual.	usual.
1*	L	divides into two brs. (one of which is very small) 1 inch from beginning.	usual, and a "Vas Aberrans," which joins Radial.
2	R	usual.	usual.
	L	usual.	usual.
2‡	R	divides into two brs. about the middle of humerus.	usual, and also the Radial.
2a	R	usual.	Both Prof. arise by one trunk. Anastomotic. Mag. arises higher than usual.
	L	usual.	Both Prof. arise from Axillary.
2ɟ	R	usual.	usual.
	L	usual.	usual.
2†	R	usual.	usual.
	L	usual.	usual.
3a	R	usual.	Both Prof. arise from Axillary.
3b	R	divides into two brs. about mid. of arm.	usual, and the Ulnar.
	L	usual.	usual.
3	R	is in front of median n.	Prof. and Anastomotic brs. arise from Axillary.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	as two brs.	usual.
4	R	at two inches from its beginning, divides into two brs., one of which crosses over the other at the bend of the elbow.	usual, and also the Radial.
	L	usual.	usual.
5	R	as two brs., one of which crosses over the other near the bend of the elbow.	Both Prof. arise by one trunk.
	L	divides, at one inch from its beginning, into two brs., one of which is very small.	usual and a "Vas Aberrans," which joined Radial.
5†	R	divides, high up, into two brs., one of which crosses over the other at the bend of elbow.	usual, and Radial.
	L	divides near its beginning into two brs., one of which crosses over the other at the bend of elbow.	usual, and Radial.
5	R	usual.	usual.
	L	usual.	usual.
5‡	R	usual.	usual.
	L	usual.	usual.
5a	R	usual.	Super. Prof. arises from Axillary.
	L	usual.	usual.
5b	R	usual.	usual.
	L	usual.	usual.
6a	R	usual.	Super. Prof. gives P. Circumfl.
	L	divides opp. middle of the arm into two brs.	usual and Radial. Super. Prof. gives P. Circumfl.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
6	R	divides near its beginning iuto two brs.	usual, and Radial.
	L	usual.	usual.
7	R	divides into two brs. near its beginning.	usual, and Radial.
	L	usual.	usual.
7a	R	usual.	usual.
	L	usual.	usual.
7b	R	usual.	usual.
	L	usual.	usual.
8	R	usual.	usual.
	L	usual.	usual.
9	R	usual.	Both Prof. are given from Axillary.
	L	usual.	usual.
9b	R	usual.	usual and P. Circumfl.
	L	usual.	usual.
9c	R	usual.	usual.
	L	usual.	usual.
10	R	usual.	Both Prof. are given from Axillary.
	L	usual.	usual.
10a	R	divides at middle of arm into two brs.	Both Prof. from Axillary. Radial arises from inner side of the Brachial.
	L	usual.	usual.
10b	R	usual.	usual.
	L	usual.	
10c	R	usual.	usual.
	L	usual.	usual.
11	R	usual.	Both Prof. arise by one trunk.
	L	usual.	usual.
12	L	usual.	Both Prof. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
13	R	perforates median n. at middle of the arm.	Both Prof. arise by one trunk.
13a	R	usual.	usual.
	L	usual.	usual.
14	L	usual.	Super Prof. as three small separate brs.
15	R	is crossed at mid. of the arm by a br. of ext. cutan. nerve, which joins the median n.	usual.
	L	is crossed at mid. of the arm by a br. of ext. cutan. nerve, which joins the median.	usual.
15a	R	usual.	Both Prof. and the Anastomotic arise by one trunk.
	L	as two brs.	usual.
15b	R	usual.	usual.
	L	usual.	usual.
16	R	usual.	usual.
	L	usual.	Super. Prof. as three small separate brs.
18	R	crosses in front of median nerve.	Super. Prof. as three small brs.
19c	R	usual.	usual.
	L	usual.	usual.
20	R	usual.	usual.
	L	crosses in front of median nerve.	usual.
21	R	usual.	usual.
	L	usual.	usual.
23	R	usual.	P. Circumfl. arises from Brachial.
	L	usual.	Infer. Prof. is larger than usual.
23a	R	usual.	Super. Prof. descends from P. Circumfl.
	L	usual.	P. Circumfl arises from Brachial.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
24	R	as two brs.	usual.
	L	usual.	usual.
26	R	usual.	usual.
	L	usual.	usual.
27	R	divides near its beginning into two brs.	usual and Ulnar.
	L	divides above inner condyle of humerus into two brs.	usual and Ulnar.
27 a	R	usual.	Super. Prof. gives P. Circumfl.
	L		
28	R	usual.	usual.
	L	usual.	usual.
29	R	usual.	P. Circumfl. arises from Brachial.
30	R	usual.	usual.
	L	usual.	usual.
31	R	usual.	Super. Prof. double.
	L	as two brs.	usual.
31†	R	usual.	Super. Prof. double, one br. being from a large Muscular br. of Axillary.
	L	usual.	Super. Prof. arises from Axillary.
31 c	R	usual.	Both Prof. arise by one trunk.
	L	divides opp. middle of humerus into two brs., one of which crosses over the other at the bend of elbow.	usual with Radial, and Radial Recurrent.
31‡	R	usual.	usual.
	L	usual.	usual.
31 d	R	usual.	usual.
	L	usual.	Both Prof. from a Muscular br. of Axillary.
31 e	R	nearly usual.	Radial is given at 1½ inch above elbow.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	-	divides at middle of the arm into two brs., one of which crosses over the other at bend of the elbow. Median n. is to inner side of both.	usual and Radial.
	L		
33	R	usual.	Super. Prof. double.
34	L	usual.	usual.
37	R	usual.	Both Prof. arise from Axillary.
37‡	L	usual.	usual, with some additional Muscular brs.
37b	L	usual.	usual.
38	R	as two brs.	A short transverse br. communicates at the bend of the elbow between the two into which the Axillary divides.
39	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
40	L	usual.	usual.
40a	L	usual.	usual.
40b	R	usual.	usual.
41	R	usual.	usual.
41a	R	usual.	Super. Prof. gives P. Circumfl.
42	R	usual.	usual.
43	L	usual.	Super. Prof. fr. a large Muscular br. of Axillary.
44	R	usual.	usual.
	L	usual.	usual.
45	R	usual.	Both Prof. from a large Muscular br. of Axillary.
47	R	usual.	Both Prof. from a large Muscular br. of Axillary.
48	R	usual.	usual.
	L	usual.	usual.
48a	R	usual.	usual.
49a	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	usual.	usual.
50	R	usual.	usual.
	L	usual.	Super. Prof. fr. a large Muscular br. of Axillary.
51	R	usual.	usual.
	L	usual.	usual, and Radial Recurrent.
52	R	usual.	usual.
	L	usual.	usual.
53	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	usual.
54	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl. Infer. Prof. absent.
55	R	usual.	usual, and Radial Recurrent.
	L	usual.	Super. Prof. as three small brs.
56	R	as two brs., one of which crosses over the other at bend of elbow.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
57	R	usual.	Super. Prof. descends from P. Circumfl.
	L	usual.	Anastomotic is absent. Radial Recurrent fr. Brachial.
58	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
59	R	usual.	Infer. Prof. rises as high as Super. Prof.
	L	usual.	usual.
60	R	usual.	usual.
	L	usual.	Super. Prof. gives P. Circumfl.
61	R	crosses in front of median n.	Both Prof. arise by one trunk.
	L	usual.	usual.
62	R	usual.	usual.
63	R	usual.	Super. Prof. as three brs.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	usual.	Super. Prof. gives P. Circumfl.
64	R	usual.	Super. Prof. descends from P. Circumfl.
	L	usual.	Super. Prof. descends from P. Circumfl.
65	R	usual.	Infer. Prof. is very small.
	L	usual.	usual.
66	R	usual.	Super. Prof. gives brs. to biceps muscle ; they pass behind the Brachial artery.
	L	divides into two brs. at one inch from its beginning.	usual, with Radial and Recurrent Radial.
67	R	crosses in front of median nerve.	Anastomotic is absent.
	L	divides at its beginning into two brs. both of which cross in front of median n.	usual and Radial.
68	R	The division into two brs. occurs a little above the usual position.	usual.
	L	usual.	usual.
69	R	usual.	usual.
	L	usual.	Both Prof. arise from Axillary.
70	R	usual.	usual.
	L	usual.	Both Prof. from a large Muscular br. of Axillary. 8 Muscular brs. arise from Brachial.
71	R	usual.	nearly usual.
	L	usual.	usual.
72	R	usual.	Both Prof. arise by one trunk. Radial Recurrent from Brachial.
	L	usual.	nearly usual.
73	R	as two brs.	Super. Prof. in two parts, one from Circumfl.. the other from Brachial.
	L	divides into two brs. at commencement.	Both Prof. arise by one trunk. Ulnar from beginning of Brachial.
74	R	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	usual.	Super. Prof. as three brs. Radial Recurrent from Brachial.
75	R	usual.	Super. Prof. arises from a large Muscular br. of Axillary, and passes in front of lat. dors. m. Infer. Prof. absent.
76	R	as two brs.	Super. Prof. as three brs. Infer. Prof. small, and from Super. Prof. The two arteries into which the Axillary divides, communicate by a short transverse br. at the bend of the elbow.
	L	usual.	usual.
77	R	usual.	Super. Prof. descends from Circumfl.
	L	is in front of median nerve, and divides opp. inner condyle of humerus into two brs.	Super. Prof. from Circumfl. Ulnar from Brachial a little above the usual position.
78	R	usual.	usual.
	L	usual.	usual.
79	R	usual.	usual.
	L	usual.	usual.
80	R	usual.	Super. Prof. gives P. Circumfl. Brachial gives six Muscular brs.
	L	usual.	Super. Prof. gives P. Circumfl.
81	L	usual.	usual.
82	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
83	R	divides above inner condyle of humerus.	Both Prof. and Anastomotic from Axillary. Ulnar from Brachial higher than usual.
	L	divides above inner condyle of humerus.	Both Prof. and Anastomotic from Axillary. Ulnar from Brachial above usual position.
84	R	usual.	usual.
	L	usual.	Super. Prof. from P. Circumfl. Brachial gives five Muscular brs. and Radial Recurrent.
85	R	usual.	usual.
	L	usual.	Super. Prof. arises from Axillary, and passes in front of lat. dorsi m.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
86	R	usual.	usual.
	L	usual.	usual, with eight Muscular brs. and Radial Recurrent.
87	L	usual.	usual.
88	R	usual.	Super. Prof. as two brs. Anastomotic as two brs. Five Muscular brs. arise from Brachial.
	L	usual.	Super. Prof. as two brs.
89	R	usual.	Anastomotic as two brs. Four Muscular brs.
	L	is crossed by a bundle of muscular fibres extending above the middle of the arm from biceps to triceps: also by a nerve reaching from ext. cutaneous to median.	usual.
90	R	usual.	usual.
	L	usual.	Super. Prof. as two brs.
91	R	usual.	usual, and eight Muscular brs.
	L	usual.	usual.
92	R	divides into two brs., one inch from commencement.	usual ; with Ulnar and four Muscular brs.
	L	usual.	Super. Prof. as 2 brs.; 6 Muscular brs.
93	R	usual.	usual.
	L	usual.	usual.
94	R	usual.	usual.
	L	usual.	usual.
95	L	usual.	Super. Prof. gives P. Circumfl.
96	R	usual.	Super. Prof. as three brs. ; Recurrent Radial from Brachial.
	L	usual.	nearly usual.
97	R	usual.	usual.
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
98	R	divides into two brs. half inch from its commencement.	Super. Prof. from Axillary ; Radial from beginning of Brachial ; others usual.
	L	as two brs.	Super. Prof. as four brs.
99	R	usual.	usual.
	L	usual.	Super. Prof. gives P. Circumfl.
100	R	usual.	usual, with eight Muscular brs., and Radial Recurrent. Super. Prof. gives P. Circumfl.
	L	usual.	usual, and three large Muscular brs. Super. Prof. gives P. Circumfl.
101	R	usual.	usual.
	L	usual.	usual.
102	R	usual.	nearly usual.
	L	usual.	Super. Prof. from a large Muscular br. of Axillary, and in front of latiss. dorsi m. Radial Recurrent from Brachial.
103	R	as two brs.	usual.
	L	usual.	usual.
104	R	usual.	usual.
	L	usual.	usual.
105	R	usual.	nearly usual.
	L	usual.	usual.
106	L	usual.	Both Prof. arise by one trunk.
107	R	divides at its commencement into two brs.	usual and Radial.
	L	as two brs.	Infer. Prof. is absent.
108	R	usual.	usual.
	L	usual.	Both Prof. arise by one trunk.
109	R	usual.	usual.
	L	usual.	usual, and six Muscular brs.
110	R	usual.	usual.
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
111	R	usual.	Super. Prof. as four brs. Five Muscular brs.
	L	usual.	usual, and four Muscular brs.
112	R	usual.	usual, and Radial Recurrent, which passes behind tendon of biceps.
	L	usual.	usual.
113	R	usual.	Super. Prof. from P. Circumfl.
	L	usual.	usual.
114	R	divides at one inch above inner condyle into two brs.	nearly usual. Ulnar above usual position.
	L	as two brs.	nearly usual.
115	R	usual.	usual.
	L	usual.	usual.
116	R	usual.	Anastomotic and Radial Recurrent arise from end of Brachial.
	L	usual.	Super. Prof. as two brs. Brachial gives seven Muscular brs. and Radial Recurrent.
117	R	usual.	usual.
	L	as two brs.	usual.
118	R	usual.	Both Prof. arise from a Muscular br. of Axillary. Recurrent Radial from end of Brachial.
	L	usual.	usual.
119	R	divides, one inch from commencement, into two brs. which communicate by transverse br. at the end of elbow.	nearly usual.
	L	usual.	usual and Radial Recurrent.
120	L	usual.	Super. Prof. arises from a large Muscular br. of Axillary. Infer. Prof. absent.
121	R	divides into two brs. at two inches from its commencement.	usual and Radial.
	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
122	R	divides one inch higher than usual.	usual.
123	L	usual.	usual.
124	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
125	R	usual.	usual.
	L	usual.	usual.
126	L	usual.	usual.
127	R	divides at commencement into two brs., which communicate by a short br. at bend of elbow.	usual and Radial.
	L	usual.	usual.
128	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	usual.
129	R	perforates the fibrous expansion of biceps m.	usual and Recurrent Radial. Super. Prof. gives P. Circumfl.
	L	as two brs.: one is very slender and perforates the fibrous expansion of biceps m.	usual.
130	R	usual.	usual.
	L	usual.	usual and Radial Recurrent. Super. Prof. gives P. Circumfl.
131	R	usual.	usual.
	L	usual.	Two Muscular brs.
132	R	divides above the margin of pronator teres m.	usual.
	L	usual.	usual.
133	L	divides into two brs. at its commencement.	

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
134	L	usual.	usual and Radial Recurrent. Super. Prof. gives P. Circumfl.
135	R	usual.	usual.
	L	usual.	usual.
136	R	usual.	usual.
	L	usual.	usual and four Muscular. Super. Prof. gives P. Circumfl.
137	R	divides into two brs. at its beginning.	usual and Ulnar.
	L	usual.	usual.
138	R	usual.	usual, and four Muscular.
139	R	usual.	usual, and seven small Muscular.
	L	usual.	usual.
140	R	usual.	usual, and one Muscular.
	L	usual.	usual, and one Muscular.
141	R	usual.	Both Prof. arise by one trunk.
145	R	divides into two brs. at two inches from its beginning.	usual and Radial.
	L	usual.	usual.
146	R	usual.	usual.
	L	usual.	usual.
148	R	usual.	usual.
149	R	usual.	usual and Radial Recurrent, which crosses behind tendon of biceps m.
	L	usual.	usual.
150	R	divides into three brs. above inner condyle of humerus.	usual, and four Muscular. Radial, Ulnar, and Inteross. also arise from Brachial.
	L	gives Inteross. a little above inner condyle.	Super. Prof. arises from P. Circumfl. Inteross. from Brachial.
151	R	divides into two brs. opp. inner condyle of humerus.	Four muscular and Ulnar. Super. Prof. gives P. Circumfl. Infer. Prof. absent.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	usual.	usual.
152	R	usual.	Both Prof. arise by one trunk, which gives also P. Circumfl. There are nine small Muscular brs.
	L	usual.	usual.
153	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
154	R	usual.	usual.
	L	usual.	usual.
155	L	usual.	Both Prof. arise by one trunk.
156	R	usual.	usual, and five Muscular.
	L	usual.	usual.
157	R	usual.	Anastomotic arises from Infer. Prof.
	L	divides into two brs at its middle.	usual and Radial.
158	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
164	R	usual.	Super. Prof. as three brs.
168	R	usual.	usual.
	L	usual.	usual.
169	R	as two brs. which communicate by a br. at bend of elbow.	Both Prof. and P. Circumfl. are given by one trunk.
172	R	usual.	usual, and five Muscular.
	L	usual.	usual.
174	R	usual.	usual.
176	R	crosses in front of a br. of ext. cutan. nerve, which goes to median.	Infer. Prof. large, supplying a deficiency of Super. Prof. and Anastomotic.
	L	as two brs.	usual.
177	R	usual.	Super. Prof. as two brs.
	L	usual.	usual and Radial Recurrent. Super. Prof. as two brs.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
178	R	usual.	usual and Radial Recurrent.
	L	divides into two brs. opp. inner condyle of humerus.	
179	R	usual.	Infcr. Prof. small. Anastomotic large.
	L	usual.	
180	L	usual.	usual, and seven small Muscular.
181	R	usual.	Super. Prof. as two brs.
	L	is crossed at two inches from beginning by a root of median n.	usual and six Muscular.
182	R	usual.	Both Prof. arise by one trunk.
	L	usual.	usual, and three Muscular. One of the latter is very large.
183	R	usual.	usual, and six Muscular.
184	R	usual.	usual.
	L	usual.	Super. Prof. arises from a large Muscular br. of Axillary.
185a	R	divides into two brs. at $1\frac{1}{2}$ inch from its origin.	Both Prof. and P. Circumfl. are given by one trunk close to the origin of the Brachial.
185	L	usual.	usual.
186	R	as two brs.	Both Prof. arise by one trunk.
	L	as two brs.	usual.
187	R	as two brs.	usual.
	L	as two brs.	usual, and four Muscular.
188	R	divides one inch higher than usual.	usual, and eight Muscular.
189	R	usual.	Both Prof. arise by one trunk.
190	L	usual.	usual.
	L	usual.	Super. Prof. as three brs.
191	R	divides into two brs. at about two inches from its beginning.	Both Prof. arise by one trunk.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	divides into two brs. at its middle.	Both Prof. arise by one trunk.
192	R	usual.	usual, and seven Muscular.
	L	divides at its middle into two brs., which at bend of elbow are close together, and external to median n.	Super. Prof. as two brs. Four Muscular.
193	R	usual.	usual, and six Muscular.
	L	is crossed at bend of elbow by a slender br. of ext. cutan. n. which joins median n.	Super. Prof. as two brs.
194	L	usual.	usual, and three Muscular.
195	R	usual.	usual.
	L	is crossed at two inches from its commencement by a n. reaching from ext. cutan. to med. n.	usual, and six Muscular two of which are large.
199	R	usual.	Both Prof. arise from a large Muscular br. of Axillary. Five Muscular brs.
	L	usual.	usual.
200	L	usual.	Both Prof. arise from a large muscular br. of Axillary.
203	R	usual.	Super. Prof. gives P. Circumfl.
204*	L	usual.	usual.
205	R	usual.	usual.
	L	divides one inch higher than usual.	usual.
207	R	usual.	usual and Radial Recurrent. Super. Prof. gives P. Circumfl.
207a	R	is crossed a little above bend of elbow by a nerve passing from ext. cutan. to median n.	Both Prof. arise by one trunk.
	L	usual.	Super. Prof. gives P. Circumfl.
207b	L	usual.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
209	R	usual.	Super. Prof. gives P. Circumfl.
210	L	usual.	usual and Radial Recurrent.
211	L	usual.	usual.
212	R	usual.	Super. Prof. gives P. Circumfl.
213	R	usual.	usual.
	L	usual.	usual.
214	R	usual.	Super. Prof. gives P. Circumfl.
215	R	usual.	usual, and nine Muscular—one of which is large. Super. Prof. gives P. Circumfl.
216	R	usual.	usual.
	L	usual.	Super. Prof. arises one inch above lower margin of lat. dorsi m., and gives P. Circumfl., which turns upwards behind that muscle.
217	R	is crossed at its middle by a nerve reaching from ext. cutan. to median n.	Super. Prof. gives P. Circumfl.
218	R	usual.	usual.
219	R	usual.	usual.
220	R	usual.	Super. Prof. arises from a large Muscular br. of Axillary.
	L	divides into two brs.	usual, and a "Vas Aberrans," which joins Radial Recurrent.
221		usual.	Both Prof. arise from a large Muscular br. of Axillary.
		usual.	Both Prof. arise from a large Muscular br. of Axillary.
222	R	divides 1½ inch from beginning into two brs., the larger of which is covered by a layer of brachialis ant. muscle.	usual and Radial.
	L	as two brs., one of wh. is very slender.	usual.
223	R	usual.	Super. Prof. as two brs., one of which gives P. Circumfl.
	L	usual.	Super. Prof. as two brs., one of which gives P. Circumfl.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
224	R	usual.	Super. Prof. gives P. Circumfl.
225	R	usual.	usual.
	L	is separated from median n. near the bend of elbow, by a broad additional origin which pronat. teres m. has from the intermuscular septum above inner condyle of humerus.	usual and Radial Recurrent.
226	R	divides at two inches from beginning into two brs., which are connected by a short br. at bend of elbow.	usual and Radial.
	L	as two brs., the larger of which divides much lower than usual, into Ulnar, Rad., and Inteross.	usual : with the Radial Recurrent and the Ulnar Recurrents. Super. Prof. gives P. Circumfl.
227	R	usual.	usual.
	L	usual.	usual.
229	R	crosses in front of median n., and divides immediately above pronator teres m.	Anastomotic from Super. Prof.
230	R	usual.	Super. Prof. arises from P. Circumfl.
	L	divides into two brs. at $2\frac{1}{2}$ inches from its beginning.	usual.
231	R	usual.	usual and Radial Recurrent, which crosses behind tendon of biceps m.
	L	is crossed near its end by a br. of ext. cutan. n. reaching to median.	usual.
232	R	usual.	usual. Eight Muscular, and Radial Recurrent. Super. Prof. as two brs.
	L	usual.	usual and Radial Recurrent. Super. Prof. as two brs.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
233	R	is crossed by a br. of ext. cutan. n. reaching to median; divides into two brs. at three inches from beginning.	usual and Radial. Super. Prof. gives P. Circumfl.
	L	divides at 3 inches from beginning into two brs. These are crossed by a tendinous cord, which reaches from outer side of biceps m. to the intermuscular septum above inner condyle of humerus.	usual and Radial, with six Muscular brs., and Radial Recurrent. The last-named crosses behind tendon of biceps m.
234	L	usual.	Super. Prof. as two brs.
235	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
236	R	as two brs., one of wh. is very slender.	usual.
237	R	divides into two brs. above its middle.	usual and Radial.
	L	usual.	usual.
238	R	divides into two brs. near its beginning.	usual, and a Vas Aberrans, which joins Radial.
240	R	usual.	usual.
241	R	divides a little higher than usual.	Super. Prof. gives P. Circumfl. and Infer. Prof.
242	R	usual.	usual.
243	R	is crossed at its middle by a nerve going from ext. cutan. to median.	usual and Radial Recurrent.
247	R	usual.	usual.
248	R	usual.	usual.
249	R	usual.	usual.
	L	usual.	Super. Prof. as two brs.; one descends from P. Circumfl.
250	R	usual.	Super. Prof. gives P. Circumfl.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
	L	usual.	Super. Prof. gives P. Circumfl.
251	R	usual.	usual.
	L	divides 1 inch above usual position.	usual.
252	R	usual.	usual.
	L	usual.	usual.
253	R	divides into two brs. at its beginning.	usual and Ulnar.
	L	usual.	Both Prof. arise by one trunk.
254		usual.	usual.
	L	usual.	Super. Prof. as two brs.
255	R	as two brs. The larger is crossed by the heads of median n.: and with the same nerve deviates to the inner side of the arm, and is covered by a layer of brachialis ant. muscle.	usual.
	L	usual.	Super. Prof. gives P. Circumfl.
256	R	usual.	Super. Prof. gives a small br., which turns upwards behind teres major m.
257	L	usual.	Super. Prof. gives P. Circumfl.
	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
258	L	is crossed by a bundle of muscular fibres, which joins biceps m. near its end. Also, at two inches from elbow, by a br. of nerve reaching from ext. cutan. to median n.	
259	R	usual.	Both Prof. and Anastomotic arise by a common trunk from Axillary.
260	R	usual.	Super. Prof. arises opp. upper part of lat. dorsi m.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
261	L	as two brs. The larger of these, accompanied by median nerve, lies close to the intermuscular septum above the inner condyle of the humerus as far as the pronat. teres, under the upper margin of which muscle it inclines outwards to its usual position at the bend of the elbow.	Both Prof. from Axillary.
262	R	divides into two brs. at two inches from its origin.	usual and Inteross.
	L	divides into two brs. at its beginning.	usual and Radial.
264	R	divides opp. inner condyle of the humerus.	
265		usual.	Super. Prof. arises from Axillary.
267	R	usual.	Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
269	R	is crossed at its beginning by a large br. extending from ext. cutan. to median nerve.	Super. Prof. gives P. Circumfl.
271	R	is in front of median nerve.	usual and Radial Recurrent. Super. Prof. gives P. Circumfl.
	L	usual.	Super. Prof. gives P. Circumfl.
272	R	usual.	usual.
	L	usual.	usual.
274	R	usual.	usual.
	L	usual.	usual.
275	R	is crossed at its beginning by one head of median n.	usual.

No.	Side of the Body.	Trunk.	Branches given above the bend of the Elbow.
276	L	divides at 2 inches above inner condyle of humerus into two brs.; the larger of these is directed inwards to the intermuscular septum, in company with the median n., and is covered by a very broad pronator teres muscle.	usual and Radial.
277	R	usual.	usual.
278	R	divides into two brs. at its beginning.	usual and Interosseous.
	L	as two brs.	usual.
279	L	usual.	usual.
281	L	is crossed at its middle by a br. of ext. cutan. nerve going to median.	
282	L	usual.	usual.
283	R	divides into two brs. near its beginning.	usual and Radial.
284	R	usual.	usual.
	L	usual.	usual.
289	R	usual.	usual.
	L	divides into two brs. near its beginning.	usual and Radial.
290	R	usual.	Both Prof. arise from a Muscular trunk of Axillary.
	L	as two brs.	
291	R	as two brs.	usual.
292a	R	as two brs.	usual.
293b	R	as two brs., the larger of which is crossed near bend of elbow by a br. of nerve extending from ext. cutan. to median.	usual.

ABSTRACT OF THE TABLE,

AS REGARDS THE TRUNK OF THE BRACHIAL ARTERIES.

		CASES	
The artery had the usual * disposition . . .	Right side .	186	
	Left . .	179	
		——	365
The artery divided into two branches above the usual situation	Right side .	32	
	Left . .	21	
		——	53
The division occurred at the distance of one inch or less from its beginning . .	Right side .	11	
	Left . .	8	
——— at more than one inch, and not exceeding three inches . . .	Right side .	9	
	Left . .	2	
——— at about the middle of the humerus	Right side .	4	
	Left . .	5	
——— opposite the inner condyle of the humerus, and not more than one inch above it	Right side .	8	
	Left . .	6	
		——	53
The artery divided considerably below the usual position.	Right side .	0	
	Left . .	1	
		——	1
It divided into three branches a little above the inner condyle of humerus	Right side .	1	
	Left . .	0	
		——	1
It was "as two branches"—that is to say, two branches resulting from the division of the Axillary occupied the place of the Brachial	Right side .	15	
	Left . .	15	
		——	30
The two arteries resulting from the division of the Axillary, or from the premature division of the Brachial, were found to communicate by a transverse branch at the bend of elbow	Right side .	6	
	Left . .	3	

Several facts having reference to the Axillary artery, which are recorded in the table and are not included in the above abstract, will be made use of in the observations on the artery.

The statements in the table respecting the branches will be noticed in the remarks on the branches.

* The arrangement considered to be the usual one is described in the remarks prefixed to the table.

BRACHIAL ARTERIES.

The observations on these arteries will be placed under the following heads :—

A. The position they occupy along the arm.

B. The place of division.

C. The presence of more than one artery in the position of the brachial.

D. The arrangement of the branches.

E. The disposition of the veins, the nerves, and the muscles, in the immediate neighbourhood of the arteries.

A. *The position occupied by the brachial arteries.* Though the brachial artery very rarely deviates from its usual position along the inner margin of the biceps muscle, yet a few cases have fallen under my observation in which the muscle would not have been a guide to the situation of the vessel. I was first made acquainted with this kind of deviation by the case of which a representation is given in the first figure of the thirty-seventh plate. In it the division of the main artery occurred in the axilla, and while the smaller part (the radial) followed the ordinary course of the brachial artery, the larger, (ulnar-interosseous, brachial?), with the median nerve, was separated by a considerable interval from the biceps muscle. From this, and two other nearly similar cases, the inference was readily drawn, that the undivided trunk might be found in the same unusual course. The correctness of the inference was soon confirmed, and I have hitherto examined three examples of this remarkable peculiarity*. In each the brachial artery and the median nerve continued from the axilla in a direction towards the internal condyle of the humerus, and to within about two inches of that prominence. At this point the vessel and nerve became covered by the pronator

* Mr. Beaumont being engaged in practising the operations for placing ligatures on the arteries, was unable to find the brachial artery. On further examination, it turned out that the artery was removed from the usual position, in the manner stated in the text. The case represented in plate 36, figure 3, which is given in illustration of the peculiarity, was met with by Mr. R. Quain, M.B., under similar circumstances.

teres muscle—which was in every case broader than usual at its origin—and inclined outwards to the ordinary position at the bend of the elbow, still under cover of the muscle. See plate 36, figure 3. Two of the three cases referred to presented slight peculiarities requiring some notice. In one—that represented in the figure—the vessel turned round a bony prominence immediately above the pronator muscle. In the second the added muscular fibres were separated by an interval from those which would constitute the muscle of its usual size, and the artery passed through the middle of the accessory muscle, at its connexion with the humerus.

B. *The division of the artery—its usual position.* The position at which the brachial artery usually divides into the arteries of the fore-arm, is stated by most anatomical writers to be opposite the elbow joint. While preparing these remarks, I have examined, with reference to this point, twenty-two preparations of the arteries of the arm, in which the division of the vessels would be said to occur in the usual situation. The result of the examination is, that, in four of the number, the bifurcation was found to take place exactly opposite the point at which the bones of the arm and fore-arm come into contact; and that in the remainder (eighteen), it was distinctly below the joint. In the latter cases, the point of division varied slightly—being in some on a level with the head of the radius, and in others opposite different parts of the neck of the bone. It may, further, be said, that, when the division is situated exactly opposite the joint, the brachial artery has the appearance, to the eye of the practised observer, of ending somewhat higher than usual.

The usual place of division will, therefore, be stated to be a little below the elbow joint.

The deviations from the usual place of division come now to be considered.—In entering on the statement of the facts bearing on this point, it is necessary to premise that, in the table, the brachial artery is said to have "divided" where the radial, the ulnar, or the interosseous, was given from it. Moreover, the cases of "vasa aberrantia"—a few in number—are included in the same category. In most instances, the table contains the name of the vessel by reason

of whose origin the main artery is said to divide; and where the mere fact of division is expressed, without mention of the branches resulting, it is to be inferred that there was nothing peculiar in this respect. In such cases, the radial will be considered to have arisen above the usual position.

It is remarkable that the deviation from the ordinary position tends constantly towards a higher part of the arm. This, if not invariable, is very nearly so *. I have seen but one instance of deviation in the opposite direction. In this single case of exception, the main artery divided between two and three inches below the elbow joint. But it must be mentioned, that the inference to be drawn from this preparation is not without deduction, inasmuch as the low situation of the chief division was accompanied by the existence of a vas aberrans, extending from the axillary to the radial artery. See plate 35, figure 4.

The following is an abstract of the information contained in the tables, in reference to the point under consideration.

The entire number of the cases in which the place of division of the main artery is recorded in the table—is	Right side	252	
	Left —	229	
		——	481
The division was in the "usual" position—in the immediate neighhourhood of the elbow joint—in	Right	199	
	Left	187	
		——	386
The brachial divided at a point more or less removed from the joint—but above it—in .	Right	40	
	Left	24	
		—	64

The last general statement includes various modes of division, occurring with different degrees of frequency, as appears from the subjoined analysis.

The radial arose above the usual position—in .	R.	29	
	L.	16	
		—	45
The ulnar—in	R.	8	
	L.	4	
		—	12
The interosseous—in	R.	2	
	L.	1	
		—	3
"Vasa aberrantia" existed—in . . .	R.	1	
	L.	3	
		—	4
			64

* "Nur sehr selten, vielleicht nie, geschieht diese Theilung bedeutend tiefer, nicht selten höher als gewöhnlich."—J. F. Meckel Handb. der Menschlich. Anat. 3. B. § 1416.

The situation of the early division of the brachial artery varies very much in different cases. It may be found at any point, from the axilla downwards. The variations in this respect are recorded in the table, and the abstract of a considerable number of cases will be found at page 258.

C. *The presence of more than one artery in the place of the brachial.* Having found that the axillary artery gives origin now to one, now to another of the branches of the fore-arm, and that the brachial divides at various points above the usual situation, it becomes necessary to review the arteries which in such cases occupy the place of the last-named vessel. Limiting, for the present, our attention to these arteries while in the arm, and in front of the elbow, where they represent the brachial, the notice of them in this place will have reference to—their number and extent; the frequency of their occurrence; the position they occupy; their communications one with the other; "vasa aberrantia;" and the question of the correspondence between both arms, in respect to such arteries.

The number.—In every example of early division of the artery that I have met with, there were two vessels in the arm below the point of division, except in a single instance. In the case here excepted, the radial, ulnar, and interosseous arteries arose together a little above the inner condyle of the humerus, so that there were for a short space three arteries in place of the brachial. See plate 33, figure 3. An instance of a similar arrangement of the vessels is described by Barclay *.

The extent to which two arteries exist, must depend on the height at which the division of the trunk is placed—a subject adverted to in a former paragraph—and when this occurs in the axilla, there will obviously be two arteries in the whole length of the brachial portion.

To estimate *the frequency* with which two arteries are likely to exist in the arm—so far as the cases in this work will serve that purpose—it is necessary to add together the instances of early division mentioned in the table of the axillary, and in

* "In a rare instance, which I have seen, and which is still preserved in my collection, the three arteries spring up together at the bend of the arm."—Loc. cit. p. 103.

that of the brachial artery, and to ascertain the proportion these bear to the entire number. This being done, the following result is obtained.

The axillary artery divided into two branches, continuing along the arm—in . .	30
The brachial divided above the usual position—in	64
	94 in 431, or 1 in about 5$\frac{1}{2}$.

The position of the two arteries.—They may be said to be generally close together, and in the usual situation of the brachial artery. But the vessels, to which the high origin belongs in different cases, are liable to some peculiarities as to position, and these severally require notice.

The radial artery often arises on the inner side, and after lying close to the larger vessel, crosses over it at the bend of the elbow *.

The ulnar has some tendency to incline away from the usual position of the brachial artery. This deviation, however, occurs only at the lower part of the arm; and as the course taken is inwards, it may be considered an inclination towards the ordinary situation of the vessel in the fore-arm. The ulnar artery may, by reason of a change of this kind from the ordinary course, be placed within a short distance from the inner condyle of the humerus; and to the same vessel belongs almost exclusively the position between the integuments and the fascia, in which it is occasionally found †.

I have always seen the interosseous artery behind the larger trunk ‡, at the bend of the arm; but Tiedemann § gives the representation of a case, in which this artery was placed much nearer to the inner condyle of the humerus.

A most remarkable departure from the course generally pursued by the branches, is that in which the larger of the two—the ulnar-interosseous (brachial ?)—instead of following the biceps muscle, courses along the intermuscular septum in a line towards the inner condyle of the humerus, until it reaches the origin of the pronator teres muscle, and thence is directed outwards, under cover of that muscle. In all the

* See plate 30, fig. 3; plate 31, fig. 2; and plate 41, figure 1.
† Plate 32, figures 1 and 2; plate 36, figure 1; and plate 41, figure 3.
‡ See plate 33; and plate 41, figure 5.
§ Op. cit. plate 15, figure 3.

examples of this class of cases that I have hitherto met with, the muscle extended upwards beyond the condyle, to a greater distance than usual, and the deviating artery was accompanied by the median nerve*.

In the foregoing observations, the greatest amount of departure from the usual position has been seen to consist of the removal of one of the branches towards the line of the inner condyle of the humerus; and there is not any recorded example that I can find of deviation to a greater extent, except one mentioned by Heister. Of this case it is stated, that the axillary at its termination divided into two branches; that one of these pursued the ordinary course of the brachial; while the other passed over the biceps and, after following this muscle on the outer side of the arm as far as the radius, took the usual place of the radial artery. The course assigned to the latter of these branches is so extraordinary—so entirely without a parallel—that I insert Heister's account of it in his own words†. I cannot, at the same time, omit to remark on a want of accuracy in the report, which in some degree diminishes the value of the observation, in my estimation. The artery is said to have divided at the lower end of the axilla, or rather below this (" ubi axillam deseruerat") and the radial is described as commencing its unusual course immediately below the shoulder joint (" mox infra articulum humeri").

Communication between the branches. The arteries resulting from the premature division of the trunk, remain in most cases distinct and independent, one of the other, to their ultimate distribution; but a communication is occasionally found to be established between them. The communications

* Plate 36, figure 4; and plate 37, figures 1 and 2.

† " An. 1729. In cadavere feminino, in quo arterias totius corporis cera rubra repleveram, hoc imprimis notatu dignum indicavi, quod arteria axillaris dextra, statim ubi axillam deseruerat, atque ad brachium pervenerat, mox in duos ejusdem magnitudinis insignes ramos brachiales divisa esset: quorum alter per internum brachii latus versus cubitum, uti alias ex consueta naturæ lege fieri solet, pergebat, ibique postea easdem divisiones, eundemque per cubitum et manum progressum ac divisionem, ut alias, quando unica tantum arteriæ brachialis truncus adest, habebat; alter vero mox infra articulum humeri super musculum bicipitem transibat, et in externo brachii latere, juxta bicipitem usque ad os radii, ac deinde secundum hujus situm ad carpum et pollicem manus descendebat, arteriamque primo illam, quæ in carpo apud ægros explorari solet a medicis, constituebat."—D. Lavrentii Heisteri " Compendium Anatomicum." Ed. 4, T. 1, Notæ (66**) p. 126.

usually occur near the bend of the arm, and they are various in their kind. In one case the connexion is effected by a short intervening artery; in another, actual reunion of the branches takes place. Only a single example of reunion of the branches has come under my immediate observation. In it the brachial artery separated near its commencement into two parts, which again became united at the lower part of the arm into a single trunk, which, after a short course, divided in the ordinary manner of the brachial. See plate 34, figure 3. This conformation of the vessels was first described by Dr. Quain*, from a case which he observed; and another example of it has been referred to in a former part of this work †.

Connexion of the branches by an intervening artery.—In all the examples of this peculiarity that I have observed, (the number of those recorded in the table is nine,) the connecting artery extended from the larger (ulnar-interosseous) branch to the radial or the radial recurrent. Its form varies—being in one instance a short, thick, straight branch; in another, of greater length and giving small offsets; in a third, curved and winding round the tendons of the biceps muscle. For illustrations of these varieties of form see plate 34; and another case, differing from those now referred to, in the circumstance of the connexion being established at a lower part of the limb and situated behind the superficial flexor muscles, will be seen at plate 36, figure 4.

"*Vasa aberrantia.*" The arteries known under this name are very slender in proportion to their length. They arise from the axillary or brachial, and instead of being distributed to the structures in their neighbourhood, they end by joining one of the arteries of the fore-arm, and hence doubtless their designation.

In the cases recorded in the table—in number nine—the vas aberrans in every instance but one ended in the radial. In most cases, the radial artery receiving the vas aberrans, arose in the usual position near the bend of the arm; but in one preparation in my collection it arose about the middle

* "Elements of Anatomy," 4th Ed. p. 538. London, 1837.
† Page 221.

of the arm *; and in another it was given off considerably below the bend of the arm—plate 35, figure 4. The radial artery in one instance presented the peculiarity of crossing behind the tendon of the biceps before it was joined by the "aberrant" vessel.

The examples of their terminating otherwise than in the radial are of rare occurrence. In one of our cases, represented in plate 35, figure 2, the "vas aberrans" joined the radial recurrent, which in that instance arose from the ulnar. And it is described and figured as terminating directly in the ulnar artery by Monro† and J. F. Meckel‡. Each of these observers had met with a single case.

What degree of correspondence exists between both arms, in reference to the high division of the arteries?—Two celebrated anatomists have maintained opposite opinions on this subject. Bichat || has stated that the existence of any peculiarity in the disposition of the vessels of one side of the body did not generally imply its presence on the opposite side. But it is to be observed that the facts on which this statement was founded are not mentioned. Meckel, on the contrary, in an elaborate paper written expressly on the varieties § that occur in the arteries of the arm, asserts with confidence—apparently from the observation of eight cases—that the high division most frequently takes place on both sides at the same time, though

* For this preparation I am indebted to the kindness of Mr. Perceval Price.

† "Remarks on the coats of arteries, their diseases, &c.," in Medical Essays and Observations, published by a society in Edinburgh. Vol. 2, Ed. 4, 1772.

‡ "Tab. Anatom. Pathol." fascic. 2, p. 8, and tab. 11.

|| "Dans les vaisseaux des membres, des variétés continuelles s'observent, et, ce qu'il y a de remarquable, c'est que dans les variétés la disposition d'un côté n'entraîne point celle du côté opposé."—"Recherches Physiol. sur la Vie et la Mort," p. 11, 3rd ed. Paris, 1805.

§ After reciting the view of Bichat as stated above, he continues—"Allein in der That scheint gerade das Gegentheil häufiger zu seyn. Die meisten Schriftsteller berühren zwar diesen Punct nicht; allein meine Erfahrung spricht offenbar für diese Meinung. Ich habe diese Bildungsabweichung jetzt in achtzehn Fällen vor mir, unter welchen ich sie in acht Leichen selbst gefunden habe. Mit Bestimmtheit weiss ich hier, dass sie in demselben Subject unter dieser Anzahl von Fällen siebenmahl auf beiden Seiten in demselben Körper gefunden wurde, und nur von einem mit Gewissheit, dass sie nur auf einer Seite vorkam. * * *

Ich bin fest überzeugt, dass Aufmerksamkeit der Anatomen auf diesen Gegenstand die Richtigkeit Meiner meinung bestimmt erweisen wird. Diese Conformität beider Seiten, auch bei Abweichungen, ist desto interessanter, da sie beweist, dass die seitliche Symmetrie, unter allen die volkommenste, sich auch bei abweicheuder Bildung erhält. Uebrigens ist der Grad dieser Abweichung night immer auf beiden seiten derselbe."—"Ueber den regelwidrigen Verlauf der Armpulsadern" in Meckel's Deutsches Archiv fur die Physiologie, B. 2, S. 117.

not necessarily at the same height. And he was so assured of correctness as to the fact, that he did not hesitate to regard it as a proof that "the lateral symmetry, the most powerful of all (kinds of symmetry), is maintained even in malformations."

Now, in order to apply the facts set forth in the table to the question under consideration, we extract all the cases which have reference to it—namely, those in which the condition of the arteries in both limbs having been noted, one or both was found to have divided higher than the usual position —and the following result is arrived at.

The entire number of cases is		61
The high division existed on both sides in the same position—in	5	
It occurred on both sides but in different positions—in . .	13	
	—18	
It occurred on but one side, the artery on the opposite side dividing at the usual situation—in	43	
	—61	

From this statement the conclusion is obvious—if a general conclusion may be drawn from such a number of facts—that most commonly there is not a correspondence between both arms with respect to the high division of their arteries.

D. *The arrangement of the branches.*—The number of the branches given by the brachial artery is often considerable, but the majority of them are so small that names are usually assigned to no more than three, viz. superior profunda, inferior profunda, anastomotica magna; and some anatomists, omitting the second of these, recognise no more than two branches as sufficiently large and regular in their distribution to require separate description. In conformity with the plan of this work; the notice of the branches in this place will be brief, and will consist chiefly of a statement of the most important deviations from their ordinary condition.

Superior profunda.—Arteria profunda superior: vel collateralis magna.—This artery is usually given from the commencement of the brachial, and winds round the posterior surface of the humerus, in company with the musculo-spiral nerve, distributing branches to the triceps muscle and in the neighbourhood of the elbow joint. It communicates largely on the outer side of the joint with other arteries *.

* Plate 26, and plate 42, figures 1 and 2.

The peculiarities of this artery noticed in the table are the following;—the division into parts, each arising separately from the parent trunk; the change in the position of its origin; the connexion with other branches at its origin. We subjoin an abstract of the cases recorded in the table, made in reference to these points.

It was found to arise as two distinct branches in—	Right side	10	
	Left	11	
			— 21
as three branches in—	Right side	5	
	Left	6	
			— 11
It gave origin to the inferior profunda in—	Right side	22	
	Left	13	
			— 35
It gave the posterior circumflex, or both were derived from a common trunk, which arose in the usual position of the superior profunda in—	Right side	39	
	Left	31	
			— 70
It arose from the axillary artery, either separately or in connexion with other branches in—	Right side	34	
	Left	28	
			— 62

The last general statement includes—

Separate origin of superior profunda from the axillary		4	
Its origin from axillary in connexion with the inferior profunda only		2	
——— in connexion with the posterior circumflex only	Right side	6	
	Left	8	
			— 14

In the remainder of the cases here referred to, the superior profunda arose from the axillary artery in connexion with several branches, and the names of those branches have been already set forth in the observations on the axillary artery,—ante, pages 230 and 231.

Inferior profunda.—Arteria profunda inferior; v. profunda altera: v. collateralis ulnaris prima.—This branch arises usually at a short distance from the last-described artery, and follows the course of the ulnar nerve towards the inner side of the elbow joint. In general it is not placed deeply at any part of its course, and therefore cannot be regarded as fitly designated by the name usually assigned to it,—that at the head of the paragraph. In some instances, however, it takes the place of the anastomotic artery on the posterior surface of the humerus,

and there lies deeply, being covered by the triceps muscle; see plate 42, figure 2. The inferior profunda is mentioned in the table to have been connected with the superior profunda, or rather derived from that branch in a considerable number of cases. It was given from the axillary,—in combination, however, with other branches,—in 28 cases. Lastly, it occasionally occurs that there is no trace of an inferior profunda branch; and to this circumstance, as well as the frequent connexion with the superior profunda, must be attributed its omission from the list by some anatomical writers. But the peculiarities with respect to origin and union with other branches having been already mentioned in the observations on the superior profunda and the axillary artery, do not require lengthened notice in this place.

Anastomotica magna.—Arteria anastomotica magna: v. profunda inferior: v. collateralis ulnaris secunda.—This branch, after crossing the brachialis anticus muscle, and piercing the intermuscular septum, turns backwards between the triceps and the lower end of the humerus, and joins a large branch of the superior profunda, both forming an arch that extends from one side of the bone to the other immediately above the olecranon fossa. This arterial arch has been named by Haller "arcus dorsalis humeri posticus." In some instances the anastomotic artery is small, and its place on the humerus is taken by the inferior profunda; see plate 42, figure 2.

Besides the foregoing branches, the brachial artery furnishes to the biceps and brachialis anticus muscles several, which are generally smaller, and have much less regularity in the position of their origin. These are known as "muscular branches." They vary very much in number. In two of the cases mentioned in the table there existed, in each, but a single branch; in two more there were as many as nine; but in the majority the number varied between four and six.

E. *The veins, nerves, and muscles in the immediate neighbourhood of the brachial artery.—The veins.* The position of the veins, with reference to the artery, when the vessels have their usual disposition, is represented in plate 27, and plate 40, figure 2. The most important deviations from the ordinary relative position of the vessels are referable to the changes

occurring in the artery, and illustrations of these will be found in plate 41.

The nerves. The median nerve crosses the brachial artery from the outer to the inner side, and in most cases over the vessel; but the nerve occasionally crosses under the artery. A few other peculiarities in the disposition of nerves may be noticed. Instead of joining in the axilla, the heads of the median nerve may be found to come together over the brachial artery; and, independently of this larger communication between the musculo-cutaneous and the median nerves, a small branch reaching from the former to the latter not unfrequently crosses the vessel. Such branches vary in size, but they are usually small; and they occupy different positions. I have, in a few instances, seen one close to the bend of the arm.

Muscles. I have, in a few cases, found the brachial artery covered for a small space by muscular fibres, which, in an operation for aneurism, must have been divided before the artery could be brought into view at these points. The muscular fibres that I have hitherto seen thus disposed with respect to the artery, were connected to the biceps or to the brachialis anticus. A thick muscular slip in one body reached from the biceps to the intermuscular septum above the inner condyle of the humerus, covering the artery for the space of about an inch and a half. See plate 37, figure 5. In another case the unusual muscular slip reached in the opposite direction—from the humerus to the biceps—at a lower part of the arm. This differed from the additional "origin," which the biceps not very uncommonly derives from the humerus, in the circumstance that the latter lies outside the artery, while the former crossed over the vessel*.

A thin layer of the brachialis anticus muscle was observed in a few instances to be spread over the larger of the two branches

* The following case may be cited as probably analogous to one of those mentioned in the text. "There was a preparation in the museum of Mr. Allan Burns, and which, I believe, is at present in the possession of Mr. G. S. Patteson of Baltimore, U.S., where a slip of muscle passed across the humeral artery, and impeded its action. On inquiry being made, it was found that the subject had been a servant girl; and, though strong and healthy in other respects, she could never, for any length of time, pump a well or switch a carpet."—Dr. Dunlop in notes to Beck's "Elements of Medical Jurisprudence." Ed. 6, p. 5. London, 1838.

(ulnar-interosseous) resulting from the premature division of the brachial artery, together with the median nerve. With respect to this arrangement of a portion of the brachialis anticus, I would observe, that the fibres which arise from the middle of the humerus, not unfrequently project at the outer side of the artery; that I have noticed some of those fibres in other cases to overlap the vessel, and that the muscular cover given to the artery by the brachialis anticus, may be regarded as the further extension inwards of fibres of the same kind from the middle of the muscle. See plate 37, figures 3 and 4.

Coinciding with a very rare deviation of the brachial artery or of a large branch, the pronator teres was observed to be considerably increased in breadth at its origin, and to be placed over the artery in a part of its irregular course. This disposition having been already sufficiently noticed, requires only to be indicated here. Ante, page 259; and plate 36, figures 3 and 4, and plate 37, figures 1 and 2.

ARTERIES OF THE FORE-ARM AND HAND.

The explanations concerning this table will be found at its end.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
1*	L	is joined near origin by a "Vas Aberrans" from Brachial.	usual.	
2	R	usual.	usual.	
	L	usual.	usual.	
2‡	R	is given from Brachial about the middle of humerus.	usual.	
2a	R	divides into two Brs. three inches above the wrist. One of these has the usual direction of the Radial, but it enters the palm between the second and third metacarp. bones. The other runs over the tendons, and penetrates to palmar surface between first and second metacarp. bones.		
2‖	R	usual.	usual.	Superf. Volæ becomes the Radial br. of index finger.
	L	usual.	usual.	
2†	R	gives a large Metacarp. br., which divides into two parts. One of these enters the palm through the carpal end of the second interosseous space, the other turns forward to the palmar surface at the anterior end of same space.	Inteross. gives a Br. which accompanies median nerve to the palm.	Superf. Volæ absent. Median br. joins Arch, and supplies the thumb and index finger. Digital. br. com. to index and mid. fingers is joined by Metacarp. br. from behind.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
3b	R	gives Inteross., or both arise from a com. trunk. Metacarp. br. turns forward to palmar surface of hand at anterior end of first inteross. space.	is given from Brachial about the mid. of upper arm, and lies over the fascia of the fore-arm; does not give Inteross.	Superf. Volæ absent. Superf. Arch and its Digital brs. are small; each of latter is joined by a Br. from the Deep Arch, except that com. to index and mid. fingers, which is joined by Metacarp. br. from behind.
	L	usual.		usual.
3	R	is directed to first metacarp. space over the tendons which usually cover it; gives Inteross. or both arise from a com. trunk. Superf. Volæ arises at 2½ inches above carpus. Inteross. gives Ulnar Recurrent brs.	arises a little above usual position, and runs between the muscles and the fascia of fore-arm; does not give Inteross. or Recurrent brs. About two inches from wrist gives a Br. which accompanies median n. to the palm.	Ulnar supplies 2½ fingers; remaining Digital brs. are given from Superf. Volæ and the Deep Arch. Median joins a Br. furnished by latter.
	L	gives Inteross., or both arise from a com. trunk. Inteross. gives Ulnar Recurrent brs.	from Axillary; it passes between the muscles and the fascia of the fore-arm; does not give Inteross. or the Recurrent brs. A Br. accompanies median n. to the palm.	Superf. Volæ supplies outer side of thumb. Median br. is given to inner side of same, and to neighbouring border of index; next Digital br. is from Deep Arch; remainder from Ulnar.
4	R	arises from Brachial at two inches from its beginning.	usual.	
	L	usual.	usual.	
5	R	from Axillary, and crosses Ulnar-Inteross. at bend of elbow.	usual.	
	L	turns behind the tendon of biceps m., and curving forward, is joined by a "Vas Aberrans" from Brachial.	usual.	
5†	R	from Brachial above usual position.	usual.	
	L	from Brachial near its commencement.		
5*	R	usual.	usual.	
	L	usual.	usual.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
5‡	R	usual.	usual.	
	L	usual.	usual.	
5a	R	divides at the wrist into two Brs. of unequal size. The larger continues to the carpal end of the second metacarp. space, where it turns forward to the palm. The other Br. is very small, and takes the ordinary course of the Radial to the first metacarp. space.		
	L	divides at the wrist into two equal parts: one follows the usual course in the first metacarp. space; the other runs to the second metacarp. space, and after giving a large Br. between the heads of second inteross. m., courses forward to join the Digital br. com. to index and mid. fingers.	usual.	
5b	R	usual.	usual.	
	L	usual.	usual.	
6a	R	usual.	usual.	
	L	from Brachial at middle of the arm.	usual.	
6	R	from upper part of Brachial.	usual.	
	L	usual.	usual.	
7	R	from upper part of Brachial.	usual.	
	L	gives Superf. Volæ two inches above carpus.	usual.	Ulnar and a large Superf. Volæ supply the fingers equally; they do not communicate directly, and there is no distinct Arch.
7a	R	usual.	usual.	
	L	usual.	usual.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
7b	R	usual.	usual.	
	L	usual.	usual.	
8	R	usual.	usual.	
	L	usual.	usual.	
9	R	usual.	usual.	
	L	usual.	usual.	
9b	R	usual.	usual.	
	L	usual.	usual.	
9c	R	usual.	usual.	
	L	usual.	usual.	
10	R	usual.	usual.	
	L	usual.	usual.	
10a	R	from Brachial at middle of the arm.	gives a Br., which accompanies median n. to the palm.	Ulnar and a large Superf. Volæ supply the fingers equally. The only communication between them is effected on the end of mid. finger and by Median br., which joins Superf. Volæ in the palm.
	L	usual.	nearly usual.	Superf. Volæ is large, and supplies the thumb and half of index finger; it has no junction with Ulnar except on the last phalanx of the index finger.
10b	R	usual.	usual.	
	L	usual.	usual.	
10c	R	usual.	usual.	
	L	usual.	usual.	
11	R	usual.	usual.	
	L	usual.	usual.	
12	L	usual.	usual.	
13	R	usual.	usual.	
13a	R	usual.	usual.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	usual.	
14	L	usual.	gives a long slender Br., which accompanies median n. to the palm.	Superf. Volæ absent. Median br. joins the Radial part of Palmar vessels.
15	R	usual.	usual.	
	L	usual.	usual.	
15a	R	usual.	usual.	Superf. Volæ is very small, and is expended in the muscles of the thumb.
	L	from Axillary.	usual.	
15b	R	usual.	usual.	
	L	usual.	usual.	
16	R	usual.	usual.	
	L	usual.	usual.	
18	R	usual.	usual.	
	L	usual.	usual.	
19	R	usual.	usual.	
	L	usual.	usual.	
20	R	usual.	usual.	
	L	usual.	usual.	
23	R	usual.	usual.	
	L	usual.	usual.	
24	R	is joined near origin by a "Vas Aberrans," from Axillary.	usual.	
	L	usual.	usual.	
26	R	usual.	usual.	
	L	is smaller than usual.	gives, close to origin of Inteross., a long and slender Br., which accompanies median n. to the palm.	Superf. Volæ absent. Ulnar ar. and the Median br. supply the fingers in nearly equal proportions.
27	R	usual.	arises from upper part of Brachial, and runs between the muscles and the fascia of the fore-arm	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	is given from Brachial a little higher than usual, and immediately runs between the muscles and the fascia of fore-arm.	
27 a	R	usual.	usual.	Superf. Volæ is larger than usual.
	L	usual.	a long Br. accompanies median n. to the palm.	Superf. Volæ absent. Median br. joins Ulnar in the palm.
28	R	usual.	usual.	Ulnar and a large Superf. Volæ supply the fingers in equal proportions.
29	R	usual.	usual.	Superf. Volæ absent.
30	R	usual.	usual.	
	L	usual.	usual.	
31	R	larger than usual.	smaller than usual.	
	L	is given from Axillary.	nearly usual.	
31 a	R	usual.	usual.	
	L	usual.	usual.	
31 c	R	usual.	usual.	
	L	arises from middle of Brachial; does not give a Recurrent br.	usual.	
31‡	R	usual.	usual.	
	L	usual.	usual.	
31 d	R	usual.	usual.	
	L	nearly usual.	nearly usual. Inteross. gives a Br. which accompanies median n. to the palm.	Median br. supplies the index finger and one side of the middle one.
31 e	R	arises from Brachial 1½ inches above elbow joint.	usual.	
	L	is given from middle of Brachial.	nearly usual.	
33	R	usual.	usual.	Superf. Volæ absent.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
34	L	usual.	usual.	
37	R	usual.	usual.	
37‡	L	usual.	usual. Com. trunk of Inteross. gives a large Br., which accompanies median n. to the palm.	
37b	L	usual.	usual.	Superf. Volæ absent.
38	R	arises from Axillary, and communicates with Ulnar-Inteross. (Brachial ?) by a short Br. at the bend of the elbow.	usual.	
39	R	usual.	a Br. accompanies median n. to the palm.	Superf. Arch is joined by Median br. and a large Superf. Volæ.
	L	usual.		
40	L	usual.	usual.	
40a	L	usual.	usual.	Superf. Arch is very small; the Digital hrs. are reinforced by Brs. from the Deep Arch.
40b	R	usual.	usual.	Superf. Volæ absent.
41	R	usual.	usual.	
41a	R	usual.	usual.	
42	R	usual.	usual.	Superf. Volæ absent.
43	L	usual.	usual.	
44	R	usual.	usual.	
	L	usual.	usual.	
45	R	usual.	usual.	
46	R	arises from Brachial near its middle.	usual.	
	L	arises from middle of Brachial.	usual.	
47	R	usual.	usual.	
48	R	usual.		Superf. Volæ absent.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.		Superf. Volæ absent.
48a	R	usual.	usual.	
49a	R	nearly usual.	small.	Superf. Arch is small. The Digit. arteries are joined by Brs. from the Deep Arch.
50	R	usual.	usual.	
	L	usual.	usual.	
51	R	Recurrent br. arises from Brachial.	usual.	Superf. Volæ is small, and is expended in the muscles of the thumb.
	L	usual.	usual.	
52	R	usual.	usual.	Superf. Volæ is of large size. Superf. Arch supplies all the Digital brs. except that com. to index and mid. fingers; this is from the Deep Arch.
	L	usual.	usual.	Superf. Volæ is large. It is joined to Superf. Arch, and supplies the thumb.
53	R	usual.	nearly usual.	
	L	usual.	usual.	Superf. Volæ is very small, and is expended in the muscles of the thumb.
54	R	usual.	usual.	
	L	usual.	usual.	Superf. Volæ is large. Superf. Arch supplies all the Digital brs.
55	R	Recurrent br. is given from Brachial.	usual.	Superf. Volæ is very small, and is lost in the muscles of the thumb.
	L	Recurrent br. is given from Brachial.	usual.	
56	R	arises from Axillary.	usual.	Superf. Arch furnishes all the Digital brs.
	L	usual.	usual.	
57	R	usual.	is at a considerable distance from flexor carpi ulnaris m. in the whole length of the fore-arm.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	Recurrent br. is given from Brachial.	usual.	
58	R	usual.	nearly usual.	Superf. Volæ is small, and is expended in the muscles of the thumb.
	L	usual.	usual.	Superf. Volæ absent.
59	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	nearly usual.	
61	R	usual.	usual.	
62	R	usual.	nearly usual.	Superf. Volæ is of large size. It joins the Arch, and supplies the thumb and one side of index finger. The Digital br. com. to index and mid. fingers is small, and is joined by a Br. of Deep Arch.
	L	usual.	nearly usual.	Superf. Volæ is of large size. It joins the Arch, and supplies the thumb and one side of index finger. The Digital br. com. to index and mid. fingers is small, and is joined by a Br. of Deep Arch.
63	R	usual.	usual.	Superf. Volæ supplies the outer side of the thumb without joining the Arch. The Digital br. com. to index and mid. fingers is from the Deep Arch.
	L	usual.	nearly usual.	Superf. Volæ absent.
64	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
65	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb. Digital arteries are joined by Brs. from the Deep Arch.
	L	usual.	usual.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
66	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	arises from Brachial at 1 inch from its beginning; is of smaller size than usual. Recurrent br. is given from Brachial.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
67	R	usual.	usual.	
	L	arises from commencement of Brachial. Recurrent br. arises from Brachial.	nearly usual.	
68	R	arises a little higher than usual. Recurrent br. is given from Ulnar-Inteross. (Brachial?)	gives Ant. and Post. Inteross. separately.	Superf. Volæ is large. All Digital brs. but those of thumb are given from Superf. Arch.
	L	gives two Recurrent brs.	usual.	Superf. Volæ joins one of the Digital brs. of the thumb. Deep Arch gives a Digital artery.
69	R	usual.	usual.	Superf. Volæ absent.
70	R	usual.	usual.	Superf. Volæ is expended in the muscles of the thumb.
71	R	usual.	usual.	Superf. Volæ is expended in the muscles of the thumb.
	L	usual.	A Br. accompanies the median n. to the palm.	Superf. Volæ is absent. Ulnar supplies 2½ fingers. Median gives brs. to the others, but they are small, and are joined to brs. from Radial.
72	R	Recurrent br. is given from Brachial.	usual.	Superf. Volæ is of good size, and joins Arch.
	L	is very slender.	usual.	Sup. Volæ absent. All the Digital brs. are given from Ulnar. Deep Arch is very small.
73a	R	usual.	arises at bend of elbow, and runs between the muscles and fascia of fore-arm; does not give Inteross. or Recurrents. Inteross. from Axillary, and gives Ulnar Recurrents.	Superf. Volæ absent.

No.	Side of the Body	Radial.	Ulnar.	Palmar.
	L	gives Inteross., or both arise from a common trunk. Inteross. gives Ulnar Recurrent brs.	arises from beginning of Brachial, and lies between the muscles and fascia of fore-arm; does not give Inteross. or Recurrent brs.	Superf. Volæ is small, and is expended in the muscles of the thumb.
74	R	Recurrent arises from end of Brachial.	usual.	Superf. Volæ absent.
	L	usual.	A small Br. accompanies median n. to the palm.	Super. Volæ absent. The Digital br. com. to index and mid. fingers, is from Deep Arch.
75	R	usual.	usual.	Superf. Volæ is small, and is lost in muscles of thumb.
76	R	arises from Axillary. It is joined to the Ulnar-Inteross. (Brachial?) by a short transverse br. at bend of elbow.	usual.	Superf. Volæ is large, and supplies the inner side of the thumb.
	L	usual.	usual.	Superf. Volæ large. Digital br. com. to 4th and 5th fingers is joined by a Br. from the Deep Arch.
77	R	usual.	usual.	Superf. Volæ absent. Superf. Arch supplies singly, but the Digital br. between 4th and 5th fingers; all its other Digital brs. are very small, and are joined by Brs. from the Deep Arch.
	L	gives Inteross., or both arise from a com. trunk. Inteross. gives Ulnar Recurrent brs.	arises opp. inner condyle of humerus, and passes immediately between the muscles and the fascia of fore-arm; does not give Inteross. or the Recurrent brs.	Superf. Volæ large. Superf. Arch is small, and supplies independently but the inner side of the little finger. The other Digital brs. are given from the Deep Arch.
78	R	usual.	gives a large Posterior Carpal br.	Superf. Volæ joins the Arch.
	L	Recurrent is larger than usual, and gives a Br. which takes place of Inteross. Recurrent.	usual.	
79	R	Recurrent as four small brs.	usual.	Superf. Volæ absent. The Poster. Metacarp. br. joins the Digital br. com. to index and mid. fingers.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
80	R	Recurrent as three small brs.	Both Recurrents arise by one trunk.	Superf. Volæ absent. The Digital br. com. to ring and mid. fingers is joined by a Br. of Deep Arch.
	L	usual.	usual.	Superf. Volæ absent. The Digital br. com. to index and mid. fingers, is joined by a Br. of Deep Arch.
81	L	usual.	usual.	Superf. Volæ absent.
82	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	nearly usual.	Superf. Volæ absent.
83	R	gives Inteross., or both arise by a com. trunk. Inteross. is of larger size than Ulnar or Radial, and gives Ulnar Recurrent brs.	arises above inner condyle of humerus, and runs superficially to the fascia of fore-arm; does not give Inteross. or Recurrent brs.	Superf. Volæ is expended in the muscles of the thumb. Superf. Arch supplies the inner side of the thumb. The Digital br. com. to index and mid. fingers is joined by a Br. from Deep Arch.
	L	gives Inteross., or both arise from a common trunk. Inteross. gives Ulnar Recurrent brs.	arises above inner condyle, and passes over the fascia for about two inches below elbow, after which it is covered by that membrane; does not give Inteross. or Recurrent brs.	Superf. Volæ is large. The Arch supplies the inner side of the thumb. The Digital br. com to index and mid. fingers is joined by a Br. from Deep Arch.
84	R	usual.	usual.	Superf. Volæ absent. Digital brs. of Superf. Arch are small, and are joined by Brs. from Deep Arch.
	L	Recurrent br. is given from end of Brachial.	usual.	Digital br. com. to index and mid. fingers is joined by a Br. from Deep Arch.
85	R	usual.	usual.	Superf. Volæ absent. Ulnar and Radial join on adduct. pollicis m. A Br. from Post. Metacarp. joins the Digital br. of index and mid. fingers.
	L	usual.	usual.	Superf. Volæ joins Arch.
86	R	Recurrent as two brs.	usual.	Superf. Volæ joins Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	Recurrent arises from Brachial, and crosses behind the tendon of Biceps muscle.	usual.	Superf. Volæ large. It joins Arch, and supplies thumb and iudex fingers. Post. Metacarp. gives a br. to the Digital artery of index and mid. fingers.
87	L	usual.	usual.	Superf. Volæ is small, and is expended in the muscles of the thumb.
88	R	usual.	usual.	Superf. Volæ becomes "Radialis Indicis" without joining the Arch.
	L	usual.	usual.	Superf. Volæ joins the artery on outer side of the thumb, without being connected to the Arch.
89	R	usual.	A Br. accompanies median n. to the palm.	Superf. Volæ is very small, and joins a br. recurrent from the Arch. Median br. joins the Arch. The Digital br. com. to index and mid. fingers is joincd by a Br. from Deep Arch.
	L	usual.	A Br. accompanies median n. to the palm.	Superf. Volæ is very small, and does not join Arch. Median br. reinforced by one from Deep Arch, supplies index and mid. fingers.
90	R	Recurrent as three brs.	A Br. accompanies median n. to the palm.	Superf. Volæ absent.
	L	usual.	usual.	
91	R	Recurrent as three brs.	Ant. and Post. Inteross. arise separately.	Superf. Volæ joins Arch by a very small br., and runs to outer side of thumb. The Digital br. between index and mid. fingers is joined by a Br. from the Deep Arch.
	L	usual.	usual.	
92	R	gives Inteross., or both arise from a common trunk; gives Ulnar Recurrent brs.	arises from beginning of Brachial; is of small size, and does not give Recurrent brs.	Superf. Volæ is small, and does not reach the Arch. The Ulnar is very small, and gives but two Digital brs.: one of these supplies inner side of little finger, the other is joined by a Br. from Deep Arch, and is com. to the ring and little fingers. Other Digital brs. are from Deep Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	usual.	Superf. Volæ is small, and does not join the Arch.
93	R	usual.		
	L	usual.	usual.	Superf. Volæ is very small, and does not join Arch. Digital br. between index and mid. finger is joined by Metacarp. br. from behind.
94	R	gives Superf. Volæ two inches above carpus.	usual.	Superf. Volæ joins Arch by a small br., and becomes "Radialis Indicis."
	L	usual.	usual.	Superf. Volæ absent. Digital br. between index and mid. fingers is joined by a Br. of the Deep Arch.
95	L	is of very small size.	is larger than usual. Ant. and Post. Inteross. are separate brs.	All the Digital brs. are supplied from Ulnar.
96	R	Recurrent is given from Brachial.	is smaller than usual.	Superf. Volæ absent. The Ulnar supplies singly, but the inner side of little finger; its other Digital brs. are small, and are joined by Brs. from the Deep Arch, except that com. to index and mid. fingers, which is solely from Deep Arch.
	L	usual.	usual.	Superf. Volæ absent. The Ulnar supplies only inner side of little finger. Other Digital brs. are joined by Brs. from Deep Arch, except that com. to the ring and little fingers, which is solely from the Deep Arch.
97	R	usual.	usual.	Superf. Volæ is of large size. All the Digital brs. are given from the Superf. Arch, except that to the outer side of the thumb.
	L	usual.	usual.	Superf. Volæ is large. All Digital brs. are given from Superf. Arch: that between index and mid. fingers is joined by Metacarp. br. from behind.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
98	R	arises from beginning of Brachial.	usual.	Superf. Volæ absent.
	L	arises from beginning of Axillary; is very slender, and does not give Recurrent br. or deep Palmar Arch. It ends between first and second metacarp. bones, there joining the Deep Arch, which is derived from Ulnar.	gives Radial Recurrent br. and the Deep Palmar Arch.	Superf. Volæ absent. Ulnar supplies all Digital brs. and the Deep Arch. This (last) is joined by the end of Radial between first and second metacarp. bones.
99	L	does not give Recurrent br.	gives Radial Recurrent br. close to origin.	Superf. Volæ absent.
100	R	Recurrent br. is given from the end of Brachial. Superf. Volæ arises $1\frac{1}{2}$ inch above carpus.	usual.	Superf. Volæ does not join Arch; it supplies radial side of thumb.
	L	usual.		Superf. Volæ does not join the Ulnar, but supplies the thumb and index finger.
101	R	usual.	usual.	Superf. Volæ joins the Arch, and supplies ulnar side of thumb. "Radialis Indicis" is given from Superf. Arch.
	L	usual.	usual.	Superf. Volæ joins br. of Radial between thumb and index finger.
102	R	does not give Recurrent br.	gives Radial Recurrent br.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	Recurrent br. is given from end of Brachial.	usual.	Superf. Volæ absent.
103	R	arises from Axillary.	usual.	Superf. Volæ absent. Superf. Arch supplies four fingers. Radial gives brs. to the thumb only.
	L	nearly usual.	nearly usual.	
104	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	usual.	usual.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by a Br. from Deep Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
105	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb. Superf. Arcb supplies four fingers.
	L	usual.	is larger than usual.	Superf. Volæ absent. Superf. Arch supplies all tbe fingers, but the br. on outer side of tbumb is joincd by a small br. of Radial.
106	L	does not give Recurrent br.	gives Radial Recurrent br.	Ulnar supplies two and a half fingers. The other fingers receive their Brs. from Radial.
107	R	arises from beginning of Brachial; gives Super. Volæ $2\frac{1}{2}$ incbes above carpus.	usual.	Superf. Volæ joins Arcb, wbicb supplies four fingers.
	L	arises from Axillary.	usual.	Superf. Volæ joins the Arcb.
108	R	usual.	usual.	Superf. Volæ is lost in the muscles of the tbumb. Superf. Arch furnisbes all tbe Digital brs.
	L	is smaller than usual.	usual.	Superf. Volæ absent. Superf. Arch gives all tbe Digital brs.; tbat on the outer sidc of tbe tbumb crosses from tbe br. on its inner side, beneath the tendon of flexor long. pollicis: it is protected from the tendon by a fibrous band.
109	R	usual.	usual.	
	L	usual.	usual.	Superf. Volæ is small, and is expended in the muscles of tbe tbumb. The Digital br. between index and mid. fingers is reinforeed from the Deep Arcb.
110	R	usual.	Botb Recurrent brs arise by ouc trunk. Interosseous gives a long Br., which accompanies median nerve to the palm.	Superf. Volæ is small: does not reach beyond the muscles of tbe thumb. Ulnar supplies two and a balf fingers. The other Digital brs. are given from the Deep Arch, and tbey are joined by small offsets of the Mcdian artery.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	Recurrent as three brs.	usual.	Superf. Volæ absent.
111	R	usual.	Ant. and Post. Inteross. arise separately.	Superf. Volæ absent.
112	R	Recurrent br. is given from end of Brachial.	usual.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by a Br. from the Deep Arch.
	L	usual.	usual.	Superf. Volæ absent.
113	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	usual.	Superf. Volæ absent.
114	R	gives Inteross., or both are given from a com. trunk. Inteross. gives Ulnar Recurrent brs.	takes origin one inch above inner condyle, and in the fore-arm lies—at first for a short space superficial to the fascia, then between it and the muscles. Does not give Recurrent brs.	Superf. Volæ joins the Arch.
	L	gives Inteross., or both are given from a com. trunk. Ulnar Recurrents arise fr. Inteross.	rises opp. head of humerus; is superficial to the fascia for a short space at bend of elbow, and afterwards between it and the muscles, being first covered by the fibrous expansion from the tendon of the biceps m. Does not give Recurrent brs.	
115	R	usual.	usual.	
	L	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.
116	R	Recurrent br. arises from the end of Brachial.	usual.	Superf. Volæ small, and does not reach the Arch. The Digital br. between index and mid. fingers is joined by a Branch from the Deep Arch.
	L	Recurrent br. is given from the end of Brachial.	usual.	Superf. Volæ is very small, and does not reach the Arch. The Digital br. between index and mid. fingers is joined by a Br. from the Deep Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
117	R	usual.	usual.	Superf. Volæ joins the Arch. The Digital br. between index and mid. fingers is joined by a Br. from Deep Arch.
	L	gives Inteross., or both arise from a common trunk. Inteross. gave Ulnar Recurrent brs.	arises from Axillary; is very slender; does not give Recurrent brs.	Superf. Volæ absent. The Digital br. of Radial is joined between thumb and index finger by a Br. from dorsal surface of hand.
118	R	Recurrent br. arises fr. end of Brachial.	usual.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by a Br. of Deep Arch.
	L	usual.	usual.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by a Br. of Deep Arch.
119	R	arises from upper part of Brachial, and communicates at bend of elbow with the larger trunk, by means of a short Br. Instead of a single Recurrent there are four small brs., which arise from the br. of communication between the Radial and the Ulnar-Interosseous (Brachial ?)	usual.	
	L	Recurrent br. is given from the end of Brachial.	usual.	Superf. Volæ absent.
121	R	fr. Brachial at two inches from its beginning.	usual.	
	L	usual.	usual.	
122	R	usual.	usual.	
124	R	usual.	usual.	Superf. Volæ large. Deep Arch reinforces the Digital br. between index and mid. fingers, and supplies the ring and the little fingers.
	L	usual.	usual.	Superf. Volæ large. All Digital brs. are from the Superf. Arch, except that to outer side of thumb.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
125	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
126	L	usual.	usual.	Superf. Volæ absent. Ulnar and Radial supply $2\frac{1}{2}$ fingers each.
127	R	arises from beginning of Brachial. Recurrent Radial is given by Ulnar-Inteross. (Brachial ?), and crosses behind tendon of biceps m.	usual.	Superf. Volæ is lost in the muscles of the thumb. The only Digital br. of Superf. Arch is that com. to the mid. and ring fingers. The others are given from the Deep Arch.
129	R	Recurrent br. is given from end of Brachial.	usual.	
	L	A "Vas Aberrans" from Axillary perforates fibrous expansion of biceps m. and joins Radial close to its origin.	usual.	
130	R	usual.	usual.	Superf. Volæ absent.
	L	Recurrent br. is given from end of Brachial.	usual.	
131	R	usual.	usual.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by Metacarp. br. from behind.
	L	arises from anterior surface of Brachial, but in usual situation. Along the fore-arm it appears closer than usual to the fascia, and is easily felt in all this part of its course, although the muscles are well developed.	usual.	Superf. Volæ is large, and joins the Arch.
132	R	is behind Ulnar at origin, and gives Inteross.,—or both arise from a com. trunk; the com. trunk is very short.	arises above pronator teres m., and passes between the muscles and the fascia. It is close to flex. carp. rad. m. as far as the lower third of fore-arm, where it bends inwards to flexor carpi ulnaris.	Superf. Volæ is small, and is lost in the muscles of the thumb. Ulnar supplies all Digital brs., except that to outer side of thumb. The Digital br. com. to index and mid. fingers is joined by a Br. from the Deep Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	usual.	Superf. Volæ is of large size.
134	L	Recurrent is given from the end of Brachial.	usual.	
135	R	is smaller than usual. Recurrent br. is very large,—about equal in size with the continuation of Radial.	gives a large Br., which accompanies median n. to the palm.	Superf. Volæ is small, and is lost in the muscles of the thumb. The Arch is joined by the Median br.
	L	is smaller than usual.	gives a large Br. with median n.	The Arch is joined by a large Median br.
136	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	is smaller than usual.	Ulnar supplies $2\frac{1}{2}$ fingers: the others are supplied by the Deep Arch.
137	R	gives Inteross., or both arise from a com. trunk.	arises from beginning of Brachial, and runs between the muscles and the fascia of the fore-arm.	
	L	usual.	usual.	
138	R	usual.	usual.	Superf. Volæ absent.
139	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	gives a Br. with median n.	Superf. Volæ absent. The Arch is joined by Median br.
140	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
141	R	Recurrent br. crosses behind tendon of biceps m.	usual.	Superf. Volæ absent.
145	R	arises from Brachial at two inches from its commencement.	usual.	Superf. Volæ joins the arch. This supplies all the Digital brs., except those to radial side of the thumb and to the index finger.
	L	usual.	usual.	
146	R	usual.	usual.	
	L	usual.	usual.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
148	R	usual.	usual.	Superf. Volæ absent. The Digital br. com. to index and mid fingers is joined by a Br. from Deep Arch.
149	R	usual.	usual.	Superf. Volæ joins the Arch.
	L	usual.	usual.	
150	R	arises from Brachial a little above inner condyle of humerus.	arises from Brachial a little above inner condyle of humerus, and passes between the muscles and the fascia. Does not give Inteross. or the Recurrent brs. Inteross. arises from Brachial a little above inner condyle of humerus, and gives the Ulnar Recurrent brs.	
	L	usual.	rises at upper margin of pronator teres m., and runs between the muscles and the fascia of fore-arm; does not give Inteross. or the Recurrent brs. Inteross. arises from Brachial a little above inner condyle of humerus, and gives the Ulnar Recurrent brs.	
151	R	gives Inteross., or both arise from a com. trunk. Inteross. gives Ulnar Recurrent brs.	arises opp. the inner condyle of humerus, and passes between the muscles and fascia of fore-arm; does not give Inteross. or the Recurrent brs.	
	L	usual.	usual.	Superf. Volæ is small, and joins the Arch.
152	L	usual.	usual.	Superf. Volæ absent.
153	R	Recurrent as two brs.	usual.	
	L	usual.	usual.	Superf. Volæ is large, and joins the Arch.
154	R	usual.	usual.	Superf. Volæ joins the Arch, and gives the Digital brs. of the thumb.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	usual.	Superf. Volæ is large, and joins the Arch.
155	L	usual.	usual.	Superf. Volæ is lost in the muscles of the thumb.
156	R	Recurrent as two brs.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
157	R	usual.	usual.	Superf. Volæ joins the Arch.
	L	arises from middle of Brachial, and does not give Recurrent br.	usual, and gives Radial Recurrent br.	Superf. Volæ absent.
158	R	does not give Recurrent br.	usual, and gives Radial Recurrent br.	
164	R	usual.	usual.	
168	L	usual.	usual.	Superf. Volæ is large, and supplies contiguous sides of the thumb and the index finger.
169	R	arises opp. head of humerus, and receives a communicating Br. at bend of elbow.	gives a short Br., which after running under the tendon of biceps m. and sending off Radial Recur. br., connects the Ulnar-Inteross. (Brachial ?) with Radial.	
172	R	usual.	usual.	Superf. Volæ small, and not to Arch. Ulnar supplies 4th finger, and one side of 3rd, and of 5th. Other fingers are supplied from Deep Arch.
	L	usual.	usual.	Superf. Volæ is lost in the muscles of thumb.
174	R	usual.	usual.	Superf. Volæ is lost in the muscles of thumb.
176	L	arises from Axillary.	usual.	
177	R	usual.	gives a Br. with median n.	Superf. Volæ absent. Median br. joins the Digital artery on inner side of thumb.
	L	Rad. Recurr. br. is given from end of Brachial.	gives a Br. with median n.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
178	R	Recurrent br. arises from the end of Brachial.	usual.	Superf. Volæ is small, and joins the Arcb.
	L	gives Inteross., or both arise from a com. trunk. Inteross. gives Ulnar Recurrent brs.	arises opp. inner condyle of humerus, and runs over muscles, except palmaris longus, whicb is in front of it; does not give Inteross. or Recurrent brs.	Superf. Volæ is small, and joins the Arcb. The Digital br. between index and mid. fingers is reinforced from Deep Arcb.
179	R	usual.	usual.	
	L	usual.	gives a Br. with median n.	Superf. Volæ absent. The Arch is joined by Median br. The Digital artery com. to index and mid. fingers is joined by a Br. of Deep Arch.
180	L	usual.	usual.	
181	R	usual.	usual.	Superf. Volæ absent.
	L	Recurrent as three brs.	usual.	
182	R	usual.	usual.	Superf. Volæ is small: it joins the Arcb.
	L	usual.	usual.	Superf. Volæ joins arch by a small br., and supplies contiguous sides of tbe tbumb and index finger.
183	R	usual.	usual.	Superf. Volæ is large, and joins the Arch. The Digital br. between index and mid. fingers is joined by Metacarpal artery from dorsal surfacc.
184	R	usual.	is covered for two inches above the pisiform bone by part of a broad palmaris longus muscle.	Superf. Volæ absent.
	L	usual.	usual.	Superf. Volæ absent.
185a	R	usual.	arises from Brachial at $1\frac{1}{2}$ inch from its origin, and runs between tbe muscles and the fascia of fore-arm.	Superf. Volæ is large, and gives a Digital br. to tbe contiguous sides of tbe the thumb and index finger. Inner side of tbe little finger is supplied from the Deep Arcb.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
185	L	usual.	usual.	Superf. Volæ is large. It joins the Arch by a very small br., and gives a Digital br., which supplies the contiguous sides of the thumb and index finger.
186	R	usual.	rises opp. bend of elbow, and is superficial to the muscles of fore-arm, except palmaris longus, under which it crosses; does not give Inteross. or Recurrent brs. Inteross. arises from Axillary, being the continuation of an artery wh. gave several large brs., viz. Subscap., Circumfl., and Profund., and gives Ulnar-Recurrent brs.	Superf. volæ absent.
	L	gives Inteross., or both arise from a com. trunk. Anter. Inteross. sends a large Br. with median n. to the palm, and another to join the Ulnar near the carpus. Post. Inteross. gives a large Metacarp. br.	rises from Axillary, and runs between the muscles and the fascia of fore-arm; lies about the middle of the limb, not approaching the flexor carpi ulnaris till arrived at carpus; is very slender, and is joined ucar the wrist by a br. of Anter. Inteross.; does not give Recurrent brs.	Superf. Volæ very small. Median br. joins arch.
187	R	gives Inteross., or both arise by a com. trunk. Inteross. gives Ulnar Recurrent brs.	arises from end of Axillary, and runs between the muscles and the fascia of fore-arm; does not give Inteross. or Recurrent brs.	Superf. Volæ small, and not to Arch. Ulnar small. Digital brs. of 2nd, 3rd, and 4th fingers reinforced from Deep Arch.
	L	usual.	arises from end of Axillary, and runs between the muscles and fascia of fore-arm.	Superf. Volæ absent. The Digital br. between index and mid. fingers is joined by a Br. from Deep Arch.
188	R	gives Inteross., or both arise by a com. trunk; does not give Recurrent br.	gives Radial Recurrent br.	Superf. Volæ is small, and does not join the Arch. The Digital br. com. to index and mid. fingers is joined by a Br. from Deep Arch.
189	R	usual.	usual.	Superf. Volæ supplies the outer side of the thumb.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	usual.	usual.	
191	R	arises from Brachial at about two inches from its beginning.	usual.	
	L	nearly usual.	lies between the muscles and the fascia of fore-arm; does not give Inteross. or Recurrent brs. Inteross. arises fr. middle of Brachial; and gives Ulnar Recurrent brs.	
192	R	usual.	usual. A Br. accompanies median nerve to the palm.	Superf. Volæ is small, and ends in the muscles of the thumb. Median br. joins the Arch.
	L	arises from middle of Brachial.	usual.	
193	R	usual.	Recurrent brs. arise by one trunk.	Superf. Volæ is large, and joins the Arch.
194	L	usual.	usual.	
195	R	Recurrent as two brs.	usual.	Superf. Volæ is large, and joins the Arch.
	L	usual.	usual.	Superf. Volæ is lost in the muscles of the thumb.
204[a]	L	gives Superf. Volæ two inches above carpus.	usual.	Superf. Volæ joins the Arch.
205	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.
207	R	Recurrent is given from the end of Brachial.	usual.	Superf. Volæ does not join the Arch. The Digital br. between index and mid. fingers is joined by Metacarp. br. from dorsal surface.
209	R	usual.	usual.	Superf. Volæ is small, and does not join Arch. The Digital brs. com. to index and mid. fingers, and to the latter and the ring finger are reinforced from Deep Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
210	L	Recurrent from Brachial.	usual.	Superf. Volæ is very small, and does not join the Arch.
211	L	usual.	usual.	
213	R	gives Superf. Volæ one inch above carpus.	usual.	Superf. Volæ supplies the thumb and index finger without joining the Arch.
	L	usual.	usual.	
216	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	usual.	
218	R	usual.	usual.	Superf. Volæ joins the Arch.
219	R	usual.	A Br. accompanies median n. to the palm.	Superf. Volæ absent. The Arch is joined by a Median br.
220	R	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.
	L	does not give Recurrent br.	gives Recurrent Radial, which is joined by a "Vas aberrans."	
222	R	arises at 1½ inch from beginning of Brachial.	usual.	Superf. Volæ absent.
	L	receives a "Vas Aberrans" fr. Axillary.	usual.	
223	R	usual.	usual.	Superf. Volæ is large, and joins the Arch.
	L	usual.	usual.	Superf. Volæ is large, and supplies the thumb and the index finger.
224	R	usual.	usual.	
225	R	usual.	usual.	Superf. Volæ joins the Arch.
	L	Recurrent is given from the end of Brachial.	usual.	
226	R	Radial arises at two inches from beginning of Brachial. The Recurrent br. is joined by a branch (of Ulnar), which turns round the tendon of the biceps m. The two principal arteries are thus made to communicate one with the other.	gives a Br., which turns round the tendon of biceps m., and joins the Radial Recurrent.	

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
	L	arises from Brachial much lower than usual, and is joined by a "Vas Aberrans" fr. Axillary. Recurrent br. is given by Brachial.	arises much lower than usual. Inteross. and the Recurrent brs. arise from Brachial.	
227	R	usual.	usual.	Superf. Volæ is large, and joins the Arch.
	L	divides into two brs. about three inches above carpus; one becomes Superf. Volæ, the other turns backwards over the tendons and then takes the course of Radial between the first two metacarp. bones.	usual.	Superf. Volæ joins the Arch.
229	R	gives Inteross., or both arise by a com. trunk.	arises immediately above pronator teres m., and runs between the muscles and the fascia of fore-arm; does not give Inteross. or Recurrent brs.	Superf. Volæ is very small, and is lost in the muscles of the thumb.
230	R	usual.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
	L	arises from Brachial at two inches and a half from its beginning.	usual.	Superf. Volæ is small, and is lost in the muscles of the thumb.
231	R	Recurrent br. is given from Brachial, and crosses behind the tendon of biceps m.	gives a Br., which accompanies median n. to the palm.	Superf. Volæ is small, and is joined by a Br. ascending from the Arch. The Arch is joined by Median br., and furnishes all the Digital arteries.
232	R	Recurrent is given from the end of Brachial.	usual.	Superf. Volæ is small, and does not join the Arch.
	L	Recurrent is given from the end of Brachial.	usual.	Superf. Volæ is small, and does not join the Arch.
233	R	arises from Brachial at three inches from beginning.	usual.	Superf. Volæ joins the Arch.
	L	arises from Brachial three inches from its beginning; is very tortuous. Recurrent br. is given from Radial-Inteross. trunk, and crosses behind the tend. of biceps m.	does not give Inteross.	Superf. Volæ is of good size.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
234	R	Recurrent as two brs.	usual.	
235	R	usual.	usual.	Superf. Volæ is small, and joins the Arch.
	L	usual.	usual.	
236	R	is joined at its commencement by a "Vas Aberrans" from Axillary.	usual.	Superf. Volæ absent.
237	R	arises from Brachial above its middle.	usual.	
	L	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.
238	R	is joined by a "Vas Aberrans" from Brachial.	usual.	Superf. Volæ is small, and does not join the Arch. The Digit. br. com. to index and the mid. fingers, and to the latter and the ring finger, are reinforced from Deep Arch.
240	R	usual.	usual.	Superf. Volæ is small, and does not join the Arch.
241	R	arises half an inch higher than usual. Recurrent br. is given from Ulnar-Inteross. (Brachial?)	gives Radial Recurrent br.	Superf. Volæ is small, and does not join the Arch.
242	R	gives Superf. Volæ two inches above the carpus.	usual, but is covered near its end by a muscular slip, extending from ulna to the small muscles of little finger.	Superf. Volæ is large, and joins the Arch. All the Digital brs., except that to outer side of thumb, are given from the Superf. Arch.
243	R	does not give Recurrent br.	usual.	Superf. Volæ is small, and joins the Arch.
247	R	usual.	usual.	
248	R	usual.	usual.	Superf. Volæ is small, and is expended in the muscles of the thumb.
249	R	usual.	usual.	
	L	usual.	usual.	
251	R	usual.	usual.	
	L	usual.	usual.	Superf. Volæ is small, and does not join the Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
252		usual.	usual.	Superf. Volæ is large, and joins the Arch.
253	R	usual.	arises from the beginning of Brachial. Above the bend of the elbow it lies between the fascia and the integuments close to the basilic vein; afterwards, insinuating itself under the fibrous expansion from the biceps m., it becomes placed between the muscles and the fascia.	Superf. Volæ is small, and does not join the Arch.
	L	usual.	usual.	
254	R	usual.	usual.	Superf. Volæ joins the Arch.
	L	usual.	usual.	Superf. Volæ joins the Arch.
255	R	arises from Axillary.	usual.	
	L	gives Superf. Volæ two inches above carpus.	usual.	Superf. Volæ joins the Arch.
256	L	usual.	usual.	Superf. Volæ is small, and does not join the Arch.
257	R	usual.	usual.	
258	L	Recurrent as three brs.	usual.	Superf. Volæ is very small, and does not join the Arch.
260	R	usual.	usual.	Superf. Volæ is large, and joins the Arch.
261	L	arises from Axillary.	usual.	
262	R	nearly usual.	lies between the muscles and the fascia of fore-arm; does not give Inteross. or the Recurrent brs. Inteross. arises from Brachial at two inches from its beginning, and gives Ulnar Recurrent brs.	Superf. Volæ absent.
	L	from Brachial at its beginning.	nearly usual.	
264	R	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
265	R	Recurrent as three brs.		
267	R	usual.	usual.	Superf. Volæ is small, and does not reach the Arch.
	L	usual.	usual.	
271	R	usual.	A large Br. accompanies median n. to the palm.	Superf. Volæ is small, and does not reach the Arch. The Median br. supplies half the fingers.
	L	usual.	gives a large Median br.	The Median br. supplies half the fingers.
272	R	usual.	usual.	
	L	usual.	usual.	Superf. Volæ is absent.
274	L	usual.	usual.	Superf. Volæ is small, and joins the Arch.
276	L	arises from Brachial at two inches above inner condyle of humerus.	does not approach ulnar nerve until it reaches the carpus.	
277	R	usual.	usual.	
278	R	nearly usual.	runs between the muscles and the fascia of fore-arm; does not give Inteross. or Recurrent brs. Inteross. arises from beginning of Brachial; gives Ulnar Recurrent brs.	
	L	arises from Axillary, being the continuation of a large trunk which furnishes the brs. to the shoulder and the arm.	usual.	
279	L	usual.	usual.	Superf. Volæ is of large size.
282	L	usual.	usual.	
283	R	arises from beginning of Brachial.	A large Br. accompanies median n. to the palm.	Superf. Volæ does not join the Arch. The Median ar. supplies the Digital brs. of the thumb and index finger.
284	R	usual.	usual.	Superf. Volæ absent.
	L	usual.	usual.	Superf. Volæ absent.

No.	Side of the Body.	Radial.	Ulnar.	Palmar.
289	R	usual.	usual.	Superf. Volæ absent.
	L	arises from Brachial near its beginning.	usual.	
290	L	usual.	arises from Axillary; is very slender.	
291	R	usual.	arises from Axillary; is superficial to the fascia for a short space above bend of elbow, and, below this point, passes between the membrane and the muscles of the fore-arm; gives a Br., which accompanies the median n. to the palm.	
292a	R	arises from Axillary.	is covered above the carpus by a small, unusual muscle.	
293b	R	arises from Axillary.		

In the foregoing table the Radial artery is said to be "usual" when it arose close to the elbow joint: gave a Recurrent branch: extended as an undivided trunk along the fore-arm close to the supinator longus muscle: turned outwards at the carpus beneath the tendons of the extensor muscles of the thumb: was directed forward to the palmar surface of the hand between the first two metacarpal bones, and between the heads of the first dorsal interosseous muscle: and, lastly, lay in the palm against the carpal end of the metacarpal bones and the interosseous muscles, covered by the tendons of the flexor muscles.

The Ulnar artery is said to be "usual" when it arose in the immediate neighbourhood of the elbow joint: gave the Interosseous artery: gave two Recurrent branches, singly or by one trunk: was directed inwards to the flexor carpi ulnaris muscle and the ulnar nerve, approaching them above the middle of the fore-arm: was covered at first by several muscles, afterwards by fascia: entered the palm over the annular ligament of the carpus: and lying between the palmar fascia and the tendons of the flexor muscles, divided into branches for the supply of the fingers.

The details of the table do not admit of being arranged in a general abstract of moderate size. They will, however, be fully made use of in the observations on the arteries to which they refer.

EXPLANATION OF PLATE XXXVIII.

The superficial arteries of the front of the fore-arm and hand are seen in this plate.

a Biceps (muscle).
b Triceps.
c Brachialis anticus.
d Inner condyle of the humerus.
e Supinator longus (muscle).
f Pronator teres.
g Flexor carpi radialis.
h Palmaris longus.
i Flexor carpi ulnaris.
i† Pisiform bone.
k Tendon of extensor carpi radialis longior (muscle).
l Extensor ossis metacarpi pollicis.
m Flexor digitorum sublimis.
n Flexor longus pollicis.
o Pronator quadratus.
p Palmaris brevis.
q Muscles of the thumb.
q† Adductor pollicis.
r Abductor digiti minimi.
s Flexor brevis digiti minimi.
t Anterior annular ligament of the carpus.

THE ARTERIES.

1. Brachial.
2. Radial.
2†. Recurrent radial.
3. Ulnar.
4. Superficial palmar arch.
5. Branch of ulnar, communicating with the deep arch.
6. Branch of radial, joining the superficial arch.
7. Radial branch of index finger (from radial artery).

NERVES.

8. Median.
9. Ulnar.
9†. Branch of ulnar, destined for the back of the hand.
9‡. Deep palmar branch of ulnar.
10. Radial.

Figure 1.—This drawing presents a view of the arteries at the lower part of the arm, of those of the fore-arm, and to a small extent of those of the hand. The dissection consisted in the removal of the integuments and the fascia, together with the veins and the cutaneous nerves. Thus the superficial arteries only, with their accompanying nerves, are displayed. But in consequence of the removal of the support given by the fascia, the muscles in the neighbourhood of the radial artery, especially the supinator longus, have fallen a little aside, and the radial artery is at its upper part more completely exposed than is natural; and by drawing aside the flexor carpi

ulnaris muscle, the ulnar artery and nerve are shown to a greater extent than they would otherwise be seen.

Figure 2.—By the removal of the integuments and the fascia, the superficial arteries of the lower part of the fore-arm, the superficial palmar arch, and the digital artery, together with the nerves distributed with them, have been exposed.

EXPLANATION OF PLATE XXXIX.

In this plate the deeper arteries of the fore-arm and hand are represented.

a Biceps (muscle).
b Triceps.
c Brachialis anticus.
d Inner condyle of the humerus.
e Pronator teres (muscle) divided, and the lower end turned outwards.
f The superficial pronator and flexor muscles divided.
g Supinator brevis.
h Radius.
i Supinator longus (muscle).
k Flexor carpi ulnaris.
k† Pisiform bone.
l Flexor digitorum profundus (muscle).
m Flexor longus pollicis.
n Extensor ossis metacarpi pollicis.
o Pronator quadratus.
p Muscles of the thumb.
q Abductor digiti minimi.
q† Flexor brevis digiti minimi.
r Interosseous muscles.
s Metacarpal bone of the thumb.

ARTERIES.

1. Brachial.
2. Radial.
2†. Radial recurrent.
3. Ulnar.
3′. Anterior ulnar recurrent.
3†. Posterior „ „
4. Anterior interosseous.
5. Deep palmar arch.
6. Principal artery of the thumb.
7. Radial branch of index finger.
8. Branches of the deep palmar arch.
9. Branch of ulnar, joining the deep palmar arch.
10. A digital branch of ulnar, given from a small remaining part of superficial palmar arch.

NERVES.

11. Median.
11†. Lower end of median cut and turned downwards. A small artery ramifies on it.
The same mark has been inadvertently placed on the anterior interosseous nerve.
12. Musculo-spiral.
12†. Radial, after having turned backwards beneath supinator longus muscle.
13. Ulnar.
13′. Deep palmar branch of ulnar.

Figure 1.—The view of the ulnar arteries given in this figure was obtained by the excision of a portion of the superficial flexor muscles, and turning outwards the pronator teres;

and the interosseous artery was exposed by drawing aside the deep flexor of the fingers. It may be observed that the radial artery happened to be slightly inclined outwards at the middle of the fore-arm by throwing the pronator muscle in that direction.

Figure 2.—The deep palmar arch is represented in this figure, together with the other branches given from the radial artery in the same situation. These vessels were exposed by dividing the anterior annular ligament of the carpus, and removing the tendons of both the common flexor muscles of the fingers, as well as the muscles of the ball of the thumb. Portions of the tendons of the flexor muscles are turned down on the fingers with the ends of two "lumbricales." In the hand from which the drawing was taken there existed but one flexor tendon for the little finger.

In both figures the nerves which accompany the arteries are shown.

EXPLANATION OF PLATE XL.

a Biceps (muscle).
a† Biceps covered by fascia.
b Triceps.
b† Triceps covered by fascia.
c Supinator longus.
d Extensor carpi radialis longior.
d† ,, ,, brevior.
e Extensor digitorum communis and extensor digiti minimi cut.
e' Extensor carpi ulnaris cut.
f Outer condyle of humerus.
f† Inner condyle of humerus.
g Olecranon process of ulna.
h Anconeus (muscle).
i Ulna.
k Extensor ossis metacarpi pollicis (muscle).
l Extensor primi internodii pollicis.
m ,, secundi ,, ,,
n Extensor indicis.

ARTERIES.

1. Branches of superior profunda.
2. Posterior interosseous.
3. Posterior branch of anterior interosseous.
4. Radial.
5. A large carpal branch.
6. Metacarpal branches.
7. Brachial.

VEINS.

8. Cephalic.
9. Median.
10. Basilic.
11. Veins accompanying brachial artery ("venæ comites").

NERVES.

12. Divisions of internal cutaneous.
13. External cutaneous.
14. Median.
15. Posterior interosseous (from musculo-spiral).

Figure 1 exhibits the arteries of the back of the fore-arm and hand. After the removal of the integuments and fascia with the cutaneous veins and nerves, the superficial extensor muscles were divided, and to a considerable extent removed. The lower ends of the divided muscles were turned down on the annular ligament, and this ligament having been drawn downwards on the inner side, the head of the ulna was exposed.

Figure 2 is intended to show the superficial veins at the bend of the arm, and their position with respect to the brachial artery. The nerves are also represented. The dissection consisted in turning aside the integument, and, for the purpose of exposing the artery, a small portion of the fascia was cut through.

EXPLANATION OF PLATE XLI.

This plate contains illustrations of the position of the veins at the bend of the elbow, with reference to various peculiarities of the arteries.

a Biceps muscle in some cases covered by fascia.
b Inner condyle of the humerus.
c Pronator teres muscle.

ARTERIES.

1. Brachial.
2. Radial.
2†. Common trunk of radial and interosseous.
3. Ulnar.
3†. The ulnar, not giving interosseous.
4. Interosseous.

VEINS.

5. Median.
5†. Median-basilic.
6. Basilic.
7. Cephalic.
8. Median nerve.

Figure 1.—The arteries are in this figure in the condition most frequently met with when the division has occurred above the bend of the arm. They are close together, and beneath the fascia.

Figure 2.—One of the arteries (the ulnar) is moved inwards from the usual situation, and lies for some space over the fascia, but afterwards sinks beneath the membrane.

Figure 3.—The ulnar artery is placed over the fascia.

Figure 4.—A small artery, which afterwards took the course of the radial, here lies immediately under the integuments. This variety is of very rare occurrence.

Figure 5.—Three arteries are shown close together, and under the fascia. The radial and ulnar separate from a common trunk; the interosseous crosses beneath them.

EXPLANATION OF PLATE XLII.

a Humerus.
a† Outer condyle of humerus.
a‡ Inner ,, ,,
b Radius.
b† Interosseous ligament.
c Ulna.
c† Olecranon process of ulna.
d Biceps (muscle).
d† Tendon of biceps.
e Brachialis anticus.
f Supinator longus.
g Pronator teres.
h Extensor ossis metacarpi and extensor primi internodii pollicis.
h† Extensor secundi internodii pollicis.
i First dorsal interosseous muscle.

ARTERIES.

1. Brachial.
2. Radial.
2′. Radial-Recurrent.
2†. Superficialis volæ.
2‡. Lower part of radial taking an unusual course over the tendons.
3. Ulnar.
3′. Anterior ulnar recurrent.
3†. Posterior ulnar recurrent.
4. Common trunk of the interosseous arteries.
4′. Anterior interosseous.
4†. Posterior ,,
5. Superior profunda.
6. Inferior ,,
7. Anastomotica magna.

NERVES.

8. Median.
9. Ulnar.
10. Musculo-spiral.

Figures 1 and 2. The small arteries ramifying about the elbow joint are represented in these figures. To display the vessels in front of the joint as they are shown in the first figure, the muscles were removed, except the brachialis anticus, and the tendon of the biceps. On the outer side the radial recurrent artery is seen to be joined to branches descending from the superior profunda; and on the inner side the anterior ulnar recurrent ascends to be connected with the anastomotica magna, and the inferior profunda.

The second figure is a view of the same preparation from behind. The superior profunda, inferior profunda, and anastomotica magna, communicate by small ramifications with the recurrent branches, viz. the posterior ulnar, and the interosseous. Across the lower end of the humerus an arch is formed between the superior profunda and the inferior profunda; in most cases the inner portion of the arch is given from the anastomotic artery. This arrangement of the vessels constitutes the "arcus dorsalis humeri posticus" of Haller and other anatomists.

Figures 3, 4, and 5, are representations of peculiarities of the radial artery, and they may be regarded as differing mainly one from the other in degree. The variation from the usual disposition in the first case, is the origin of the superficialis volæ above the position at which it commonly arises. In the second there is the additional peculiarity, that the radial artery, after giving rise to the superficialis volæ, is directed backwards over the tendons of the extensor muscles of the thumb. The radial artery of the last figure divides soon after its commencement into two parts. One of these continues in the usual situation of the radial as far as the carpus, and becomes the superficialis volæ; the other turns over the muscles to the outer side of the limb, and after coursing superficially along the fore-arm and carpus, takes up the position of the radial between the first two metacarpal bones; or, in accordance with the manner of describing the vessels in the preceding figure, it may be said of this case, that the superficialis volæ is given at the upper part of the fore-arm, and that the radial artery is directed out of its ordinary course.

EXPLANATION OF PLATE XLIII.

The first figure of this plate continues the subject of the last three of the preceding plate. The others are illustrations of some of the peculiarities of the interosseous artery.

a Biceps (muscle).
a† Brachialis anticus.
b Triceps.
c Inner condyle of humerus.
d Superficial muscles cut.
d† Pronator teres.
e Supinator longus.
f Flexor carpi ulnaris.
g „ longus pollicis.
h Flexor digitorum profundus.
i Interosseous ligament.
k Pronator quadratus (muscle).
l Extensor ossis metacarpi and extensor primi internodii pollicis.
m Extensor secundi internodii pollicis.
n Extensores carpi radialis longior and brevior.
o First dorsal interosseous.

ARTERIES.

1. Brachial.
2. Radial.
2†. Branch of radial crossing over the tendons of the extensor muscles of the thumb.
2‡. A branch of radial running beneath the tendons of the extensor muscles.
3†. Uluar.
„ not giving interosseous.
4. Interosseous.
4†. Interosseous given from the axillary.
5. A large branch of ulnar accompanying the median nerve, and joining the palmar arch.

NERVES.

6. Median.
7. Ulnar.

Figure 1. The radial artery divides at the lower part of the fore-arm into two parts of equal size. One of these takes the course exemplified in the former plate, namely, outwards over the tendons, and then forward to the palmar surface between the heads of the first dorsal interosseous muscle. The other branch turns backwards also, but beneath the tendons. From each artery a branch is directed over an interosseous space to the palmar surface; and the first of these joins the artery of the thumb; the second is connected to the digital artery common to the index and middle fingers.

Figure 2. The superficial pronator and flexor muscles having been divided and partly removed, and the deep com-

mon flexor muscle of the fingers drawn aside, the distribution of an interosseous artery given from the axillary is displayed.

Figure 3. An example of a branch of the ulnar artery accompanying the median nerve, and forming part of the palmar arch, is represented in this drawing. The "median" artery—for so such branches are sometimes named—is of unusual size, and has the additional peculiarity of perforating the median nerve. The ulnar artery was in this case separated from the ulnar nerve by a considerable interval in the entire length of the fore-arm.

EXPLANATION OF PLATE XLIV.

This plate contains examples of small radial and ulnar arteries joined by branches of the anterior interosseous.

a Biceps (muscle).
b Brachialis anticus.
c Outer condyle of the humerus.
d Inner ,, ,,
e Supinator longus (muscle).
f Superficial muscles cut.
f† Pronator teres (its lower end) turned outwards.
g Flexor longus pollicis.
h ,, digitorum profundus.
i Radius.
k Interosseous ligament.
l Pronator quadratus (muscle).
m Extensor ossis metacarpi, and extensor primi internodii pollicis.
m† Extensor secundi internodii pollicis.
n Tendons of extensor muscles cut and thrown across the hand.
n† Extensor indicis.
o Dorsal interosseous muscles.

ARTERIES.

1. Brachial.
2. Radial.
2†. A slender radial given from the axillary.
3. Ulnar.
3†. A slender ulnar given from the axillary.
4. Interosseous.
4†. Branch of anterior interosseous joining the radial.
4‡. Branch of anterior interosseous passing between the bone and muscles, and joining the ulnar.
5. Branch of ulnar forming part of the palmar arch. It accompanied the median nerve.
5†. Branch of interosseous joining the palmar arch. It descended with the median nerve.
6 Posterior branch of anterior interosseous—of large size. It gives several branches, the largest of which reinforces a slender radial.
7. Ulnar nerve.

Figure 1.—A slender radial artery, given from the Axillary, is reinforced at the lower end of the fore-arm by a branch of

the anterior interosseous. To bring this unusual offset of the interosseous into view, the radius was cleared of the muscles. There was also present in this case a considerable "median" artery, given from the ulnar.

Figure 2.—A branch of the anterior interosseous, resembling, "mutatis mutandis," that in the preceding figure, joins a slender ulnar artery. Here, too, there is a large "median" artery, but it is derived from the anterior interosseous.

Figure 3 is a view of the back of the hand. To expose the vessels more fully, some of the tendons of the extensor muscles were divided and turned aside.

The interosseous, in this instance, compensates for the small size of the radial artery in the following manner:—The posterior division of the anterior interosseous divides into branches. The largest branch joins the radial, and the artery resulting from their union passes forward to the palmar surface at two points of the first interosseous space. The other branches of the interosseous are distributed over the metacarpus, and send perforating arteries between the heads of the interosseous muscles to join the deep palmar arch.

EXPLANATION OF PLATE XLV.

a Biceps (muscle).
b Inner condyle of humerus.
c Supinator longus.
d Palmaris longus.
d† A muscle which may be named a second palmaris longus.
e Flexor carpi ulnaris.
f Tendons of the extensor muscles of the thumb.
g Muscles of the ball of the thumb.
h Anterior annular ligament of the carpus.

ARTERIES.

1. Brachial.
2. Radial.
2†. Superficialis volæ.
2‡. A branch of deep arch reinforcing the digital artery of the index and middle fingers.
3. Ulnar.
4. A "vas aberrans," or a "median" branch, extending from the brachial to the palmar arch.

Figure 1.—A slender artery given from the brachial, after running for some distance over the muscles, takes, at the lower

part of the fore-arm, the position of a "median" artery, and joins the palmar arch.

Figure 2.—This figure is introduced to show the ulnar artery covered by a muscle for several inches above the carpus. The muscular fibres arose from a slender tendon, and, after spreading inwards over the artery, they divide into two parts. One of these, situated close to the tendon of the palmaris longus, becomes connected to the annular ligament by tendinous fibres, and from this point some muscular fibres proceed inwards under the ulnar artery to join the muscles of the little finger. The other division of the unusual muscle, narrowing, extends downward over the muscles of the little finger, and becomes blended with them a little above its first phalanx.

In the other figures of this plate some peculiarities of the superficial palmar arch, and especially of the "arteria superficialis volæ," are represented.

Figure 3.—The superficialis volæ is of large size, and forms part of the superficial palmar arch. All the digital branches are furnished by the arch.

Figure 4.—The superficialis volæ is of large size, and is distributed to several fingers, without being connected to the ulnar artery.

Figure 5.—The superficialis volæ becomes the external digital artery of the thumb. The end of the ulnar artery is joined to the radial on the adductor pollicis muscle—a portion of the tendon of the long flexor of the thumb was removed to show this communication. The digital artery, common to the index and the middle fingers, is joined by a considerable branch of the deep arch.

Figure 6.—The superficialis volæ becomes the radial branch of the index finger.

EXPLANATION OF PLATE XLVI.

This plate contains illustrations of some variations of the superficial palmar arch, of the deep palmar arch, and of the digital arteries.

ARTERIES.

1. Radial.
1†. Superficialis volæ.
1‡. A large branch of the radial artery or of the deep palmar arch.
2. Ulnar.
3. Median.
4. Deep palmar arch.
4†. Digital artery given by the deep palmar arch.
4‡. Branch from the deep-arch joining the ulnar.
5. Digital artery of the thumb derived from the radial when about to penetrate the first interosseous space. This branch takes its course over the dorsal surface of the first interosseous muscle, to the point at which it becomes visible in the drawing.
5†. Digital artery common to the index and middle fingers.

Figure 1. A "median" artery descends beneath the anterior annular ligament of the carpus, and gives the digital branches to the outer side of the thumb, and to the same side of the index finger.

Figure 2. The ulnar artery supplies but two fingers and a half. The digital artery common to the index and the middle fingers, is given from the deep arch. The internal artery of the thumb arose from the radial (where this vessel was about to penetrate between the two first metacarpal bones) and descended between the first dorsal interosseous muscle and the integument to the point at which it appears in the drawing. It gives a branch (6) which crosses between the tendon of the long flexor muscle and the bone, to assist the artery on the outer side. The little branch is separated from the tendon in its transverse course by a fibrous band, which, with the bone, forms a distinct canal for it. A "median" artery of small size, here fully exposed by removal of the anterior annular ligament of the carpus, terminates by joining three of the digital arteries.

Figure 3. The ulnar artery is of small size, and gives but one digital artery, that common to the middle and the ring fingers. It is joined to a large branch (1‡) of the radial artery at the middle of the hand, and to three other branches (4†) of the same artery.

The radial artery is of large size. It furnishes all the digital arteries, except the single one given from the ulnar. The branches come forward from beneath the tendon of the long flexor of the thumb and the tendons of the common flexors of the fingers; and one branch (4‡) emerges between the muscles of the little finger where the communicating branch between the superficial and the deep arches is ordinarily placed.

Figure 4. The superficial palmar arch, formed by the ulnar artery and "superficialis volæ," is very slender. The digital branches are, with one exception, derived from the radial, and are joined by the little offsets from the superficial arch. The ulnar furnishes but a single digital artery—that to the inner side of the little finger.

Figure 5. A large metacarpal branch of the radial artery is directed forwards over the posterior surface of the second interosseous space to the cleft between the index and middle fingers, where it becomes the digital artery common to these fingers, in the manner shown in the next figure.

Figure 6 is intended mainly to show the further course of the unusual artery represented in the preceding figure. It is marked 5†, and is joined by a small branch of the superficial palmar artery.

Figure 7. The radial furnishes all the digital arteries. They are joined by small branches of the superficial arch. To expose the vessels as they are represented in this figure, the tendons of the common flexor muscles were withdrawn from the anterior annular ligament of the carpus, and cut away. The ligament remains entire.

Figure 8. The deep palmar arch has been brought into view by preparation similar to that used in the last case, except that the annular ligament was cut through. The radial artery is here of extremely small size, and the deep arch is derived from the ulnar artery.

RADIAL ARTERY.

For the purpose of rendering the subsequent observations on the peculiarities of the radial artery intelligible, it will be sufficient to make, in reference to the "usual" disposition, this brief statement, viz. that the vessel arises opposite, or a little below the middle of the elbow joint, and courses beneath the fascia along the inner margin of the supinator longus as far as the carpus; that it here turns outwards beneath the tendons of the extensor muscles of the thumb, and penetrates to the palmar surface in the first interosseous space, and between the heads of the first dorsal interosseous muscle; that it furnishes the branches named recurrent radial, superficial volar, carpal (anterior and posterior), besides several small muscular branches, given along the fore-arm, and palmar and digital arteries. The disposition here described is illustrated in plates 38 and 39.

The number of cases in which the condition of the radial artery is stated in the table, is	Right side	229	
	Left	200	
			—429
It had the "usual" disposition described—above—in	Right	177	
	Left	157	
			—334
The vessel presented some considerable deviation from the ordinary state in	R.	52	
	L.	43	
			— 95 about 1 in 4½.
			— 429

The further observations on the radial artery will have reference, as in other parts of this work, chiefly to the peculiarities of the vessel. They will be made in the following order:—

A. The place of origin.

B. The course along the fore-arm.

C. The size of the vessel.

D. Its entire absence.

E. Connexion with other arteries.

F. Disposition of the branches.

A. *The place of origin.* The whole of the cases noted with reference to this point, are in number . . { Right 231, Left 198 — 429

The artery arose in the "usual" situation—a little below or opposite the elbow joint*—in . . . . . { R. 199, L. 177 — 376

It arose in some unusual position—specified underneath—(see plate 31) . . . { R. 32, L. 21 — 53, or 1 in nearly $8\frac{1}{11}$

— 429

The origin was from the axillary artery—in { R. 9, L. 7 — 16

from the Brachial, within two inches of the beginning of this—in . . . . . { R. 13, L. 6 — 19

from the same artery at its middle . . . . { R. 5, L. 8 — 13

from the same artery near the lower end . . . . { R. 5, L. — 5

— 37

— 53

B. *The course along the fore-arm.* The disposition of the artery in the arm, when it happens to arise above the ordinary situation, having been already referred to (page 263), our attention will here be restricted to its course in the fore-arm. In the ordinary course—briefly described above—the artery is very constant, the instances of deviation of any kind occurring very seldom; and in this respect the radial contrasts with the other principal artery of the fore-arm. Examples, however, do occur, though rarely, of deviation to a considerable extent, from the general course. Thus the radial artery may be found over the fascia, instead of under that membrane: on the surface of the supinator longus muscle, not along its inner margin: and superficial to the tendons of the extensor muscles of the thumb, in place of being beneath them.

Such peculiarities will be found to be illustated in the cases now to be described.

1. After arising from the brachial about its middle, the radial artery was found in a single case to run over the aponeurotic expansion of the biceps muscle and the fascia of the fore-arm, and to cross immediately behind the median-basilic

* See the remarks on the division of the brachial artery at page 260.

vein *. At the end of the upper third of the fore-arm it divided into two nearly equal parts; one of these turned over the outer side of the limb, and penetrated to the palmar surface in the second interosseous space of the hand; the other lay in the ordinary direction of the radial artery, and after crossing over the tendons of the muscles of the thumb, passed through the first interosseous space.

2. Another case† presented a conformation in some respects similar to that just noticed. The radial artery arose in the usual position, and separated, a little below the elbow joint, into two branches of nearly equal size; one of which, after running in the course of the radial artery in the fore-arm, continued in a straight direction to the palmar surface of the hand, over the muscles of the thenar eminence, and joined the superficial arch in the manner of the superficial volar. The other branch inclined outwards over the supinator longus muscle, and ran nearly parallel with the former at the distance of about an inch from it to penetrate between the first two metacarpal bones. One of these divisions of the artery, therefore, occupied the position of the radial artery in the fore-arm, while the other took its place in the hand‡. Now, of this case it might be said, that the radial artery turned backwards out of its course, and that the superficial volar arose much above the ordinary situation§; and this mode of viewing the arteries

* Plate 41, figure 4.—Tiedemann, in speaking of the radial artery, seems to imply that it may be over or under the fascia, indifferently. These are his words—"Arteria radialis vel ab aponeurosi brachii inclusa est, vel fasciam tendineam perforans iuter hanc et cutem cum vena cephalica decurrit."—Explicat. Tab. xiv. p. 169.

The vein referred to as the "cephalic" in this extract cannot be easily determined, because that name is given in the explanation of the second figure of the same plate, to a vein which accompanies the radial artery, and runs to the inner side of the biceps muscle. Dr. Green says of the radial artery—"In some rare instances the vessel pierces the brachial aponeurosis, and becomes quite superficial. I have a distinct recollection of one such occurrence."—Loc. Cit. page 19.

M. Bourgery (Op. Cit. T. iv. pl. 48, fig. 5) gives the representation of a very extraordinary case. The end of the brachial, and the radial and ulnar arteries, are seen to lie over the fascia. The last-named vessel runs over the palmaris brevis muscle also, but beneath the palmar fascia. The interosseous artery penetrates the fascia, being given from the ulnar, which is on that membrane. It is to be regretted that the figure is not accompanied by any detailed description.

† Plate 42, figure 5.

‡ There is in the museum of the College of Surgeons of Edinburgh, a preparation showing the same arrangement of the arteries. It is one of the collection of Dr. Barclay.

§ "In some subjects," says Allan Burns, "the radial artery, very soon after its origin, gives off the arteria superficialis volæ, which is long, small, and, in some cases, tortuous, and descends iu the situation of the radial artery, which twists to the back of

will be strengthened by comparing their arrangement with that which is shown in the following case.

3. In this instance the radial artery, at the distance of about three inches from the hand, passed obliquely over the muscles of the thumb to enter the palmar surface at the accustomed point; while the superficial volar, of large size, alone occupied the place of the radial immediately above the carpus *. The previous case may obviously be regarded as a farther extension of the same arrangement. In both, the radial artery was directed out of the general course, and lay nearer to the surface than usual; in both, the superficial volar alone existed at the point at which the pulse is commonly felt.

4. The disposition of the artery to be here referred to, is shown in plate 43, figure 1. The radial divides, between two and three inches from the lower end of the radius, into two parts of equal size, which run parallel, and close one to the other, to the carpus. At this point one is directed over the small tendons, and dips into the first metacarpal space; this vessel may be regarded as the continuation of the radial artery. The other branch crosses under the tendons of the extensor muscles of the thumb, together with that of the extensor carpi radialis longior, and enters the second interosseous space. The case described is the only example of such an arrangement of the vessels that I have observed.

C. *The size* of the radial artery does not often vary to any considerable extent. A few instances are mentioned in the table of the size being decidedly less than ordinary; and a few others are recorded, in which it exceeded the most frequent or standard condition.

It may here be stated, that every case we examine of variation of the size of the arteries of the fore-arm will prove that there prevails among them what might be termed a principle of compensation—the deficiency of one being compensated by the increase of the other. Thus the radial artery is larger than usual in the case delineated in plate 46, figure

the radius." He adds that he had seen "several examples" of the "lusus," and that Dr. Baird had observed "three instances in the same family,"—meaning, I apprehend, that he had distinguished it by the touch in living persons.—"Observ. on the Diseases of the Heart," &c., p. 300.

* Plate 42, figure 4. The same peculiarity has been noticed by Tiedemann and others.

7, and it gives origin to the digital arteries, which are ordinarily supplied by the ulnar. An example of a remarkable diminution of size is given in plate 46, figure 8. It will be observed that in the latter instance the radial artery, instead of giving off certain branches to the hand, ends beneath the first metacarpal bone, where it joins the deep palmar arch; and this, together with the other branches usually derived from the radial, is furnished by the ulnar artery.

Again, the small size of the radial artery has been found to be compensated for in another and very different manner—namely, by the junction of a branch from the anterior interosseous. I have hitherto met with two forms of such reinforcement of the vessel. In one, the slender radial, running the ordinary course in front of the fore-arm, was joined at the wrist by a considerable branch of the anterior interosseous, and was in consequence augmented to about the ordinary size—plate 44, figure 1. In the other form of the conformation, shown in the third figure of the same plate, the reinforcing branch was derived from the posterior division of the same artery, and joined the radial behind the carpus. See the observations on the interosseous arteries.

D. *Absence of the radial artery.* The very reduced size of the artery noticed in the last paragraph, prepares us in some degree for its entire absence. This peculiarity, however, is of extreme rarity. I have never seen any example of its occurrence; and the only recorded one that I have met with is mentioned by Professor Otto, who gives of it the following account * :—"The radial artery, in very rare instances, is entirely wanting, and there can no pulse be felt on the fore-arm. I have observed this during life, and after death, on both arms of an aged woman; from the radial artery there is merely the recurrent and a few little muscular branches; the descending trunk is entirely wanting; hence the interosseal is larger, and gives off the branch to the hand, which is naturally sent from the radial †." It may be noticed, that the absence of the

* Loc. cit. p. 302.

† The preparation No. 2047 in the Catalogue of the Anatomical Museum at Breslaw, was probably taken from the body of the person here alluded to. It is noticed in M. Otto's Catalogue in these words :—"Ein linker Arm, an welchem die Arteria radialis fehlt, weshalb im Leben an diesem Arme kein Puls zu fühlen war." "Neues Verzeichniss der anatomisch. Sammlung, &c. zu Breslau"—1838.

radial in the fore-arm was made up for in the way which the cases immediately before under observation would lead us to expect, namely, by the anterior interosseous.

E. *Connexion with other arteries.* Under this head it is proposed to include the direct connexion of the trunk of the radial with other arteries, without referring to the various anastomoses that exist in the hand, between its branches and those of the ulnar artery. The connexions in question having been already described in detail in preceding parts of this work, it will here be sufficient to make reference to them, viz. the branches of communication between the radial and ulnar arteries occurring opposite the bend of the elbow*: the modes of termination of "vasa aberrantia†:" and the connexion with the interosseous artery, pointed out in a recent paragraph.

F. *Disposition of the branches.* When the radial artery arises above the bend of the elbow, it gives origin, in the arm, only to branches of insignificant size (see plate 31). An exception to this statement occurs in a case,—the only one of the kind I have met with,—represented in plate 30, figure 3. The radial artery there arises in the axilla, and furnishes the subscapular, the circumflex, and profunda branches.

The branches ordinarily given from the radial artery in the fore-arm and hand, are the following:—the radial recurrent; superficial volar; anterior and posterior carpal; metacarpal; the branches given to the thumb and the index finger; and the deep palmar arch.

Radial recurrent.—This branch usually takes its rise a little below the bend of the elbow—close to the commencement of the radial artery when this vessel arises in the ordinary situation. It distributes offsets in different directions; those which ascend in the immediate neighbourhood of the musculo-spiral nerve communicate with the superior profunda artery; the descending branches are distributed to muscles. See plates 38 and 39, and plate 42, figure 1.

The deviations from the more usual arrangement affect the size, the number, the place of origin and course, and the connexion between this and other arteries.

The size of the recurrent is occasionally found to be greater or less than ordinary. In two instances I observed it of equal

* Page 264. † Page 265.

thickness with the continuation of the radial artery, and in one it furnished the interosseous recurrent,—or a branch in the place of that which is so named.

Instead of a single branch distributing offsets in different directions, two or more are occasionally met with. Thus, in the table, cases are mentioned in which there were two, three, or even four branches arising separately from the radial artery in the place of the recurrent.

The origin is transferred not unfrequently to the brachial artery, occasionally to the ulnar, and rarely to the interosseous; when derived from the brachial artery, it may be found to cross behind the tendon of the biceps *.

Besides the anastomoses of branches about the elbow joint, in which the radial recurrent has a share, I have observed a few examples of a different kind of connexion with other and larger arteries. In one of these, depicted in plate 35, figure 2, it is joined to a "vas aberrans;" in another it forms part of a communication established between the radial and ulnar arteries—plate 34, figure 4.

Arteria superficialis volæ.—This branch presents several peculiarities in size, mode of distribution, and place of origin.

The number of observations made on its condition and recorded in the table—is . . . . . Right side 132, Left 103 —235

And they were so disposed as to admit of being arranged in three classes, as follows:

1. The artery was of very small size, and was soon expended in the muscles of the thumb without joining either the superficial palmar arch, or any of the digital arteries; or it was altogether wanting—in . . . Right—80, Left —61 —141

In the remaining cases the superficialis volæ is to be understood to have been of rather considerable size.

2. It ended by forming part of the superficial palmar arch—in . . . . Right—40, Left —25 —65

It joined the superficial arch, and continued onward to furnish a digital branch or branches to the thumb, or the index finger, or to both of these—in . . . Right— 2, Left — 2 —— 4 —69

3. It furnished one or more digital arteries, but was not connected to the superficial arch—in . Right—17, Left — 8 ——25 —— 235

* Plate 42, figure 1; plate 35, figures 4 and 2; and plate 33, figure 2.

With respect to the first two of the preceding classes: illustrations of one, the first, are contained in plate 38, 39, 43, 44, and others; and the second is exemplified in plate 42, figure 3; plate 45, figure 3; and plate 46, figure 4.

The disposition of the artery in the third series or class, has several modifications. Thus, in some instances it is of large size, and furnishes the digital arteries of several fingers—plate 45, figure 4. In others it passes directly to one side of the thumb, or of the index finger; or again, it supplies both these fingers wholly or in part. Two of these peculiarities are represented in plate 45, figures 5 and 6: in the former of these figures, the superficial volar ramifies on the outer side of the thumb; in the latter, it is distributed on the same side of the index finger, becoming the branch named "radialis indicis."

The place of origin of the superficial volar has been noted only with respect to the cases included in the last two classes above referred to—those, namely, in which the artery was of moderate or considerable size. It usually takes its rise close to the lower end of the radius, where the radial artery is about to turn to the dorsal aspect of the hand; and the deviations from this point are not of frequent occurrence. The table contains notes of ten instances in which it was given at the distance of from one inch and a half to two inches and a half above the ordinary position; and I have met with one (not contained in the table) in which the artery may be said to have arisen near the commencement of the radial—plate 42, figure 5.

In most instances of early origin of the superficial volar, the radial artery and the branch run close together as far as the carpus (plate 42, figure 3), but when the parent vessel inclines prematurely to the back of the hand, a course rarely met with, the superficial volar alone is in the situation at which the pulse is generally felt by the medical practitioner to ascertain the state of the circulation *. This fact is shown in the fourth and fifth figures of the plates last referred to.

* It is insinuated by Allan Burns (loc. cit.) that an injurious line of practice had, in one case, been pursued by a physician, "a keen Brunonian," in consequence of the presence of this conformation of the arteries. The patient died. Burns adds—"On dissecting him, we found that the physician had never felt the pulsation of the radial artery, having all along mistaken the action of the arteria superficialis volæ for that of the radial artery."

In the foregoing comments, and the illustrative figures, the superficial volar artery has been observed to have very different directions and modes of distribution in different cases; in one instance, to the outer side of the thumb; in another, towards the middle of the palm; in a third, to some intervening point. With the view to throw light in some degree on these changes of position, I would remark that, in a dissection of the outer side of the hand, if made with moderate care, several small branches will be found crossing over the small muscles of the thumb at short intervals—plate 38, figure 2; and it may be supposed that the enlargement of these—now in one line, again in another—will serve to account for the varieties that occur in the course of the branch in question.

Carpal and metacarpal branches.—Two carpal branches are recognised by anatomists—the anterior and posterior. The former is very small, and I have not noticed any peculiarity affecting it that requires observation. The posterior carpal is often conjoined with the metacarpal branch. This or the united trunk, gives several small branches, the most remarkable of which (metacarpal branches) descend along the posterior surface of the dorsal interosseous muscles, and communicate with the deep palmar arch by means of little arteries that penetrate the interosseous spaces between the heads of the interosseous muscles. See plate 40, figure 1; in which, however, the artery is somewhat larger than it is commonly found to be.

The most frequent peculiarity of these arteries, independently of alterations of size, consists in the enlargement of the metacarpal branch that lies over the second interosseous space, and its distribution to the index and the middle finger, whose common digital branch it becomes. This arrangement was noted in twelve of the cases recorded in the table, eight occurring on the right side, and four on the left. It is illustrated in plate 46, figures 5 and 6.

A metacarpal branch was also occasionally observed to take a similar course over the interosseous muscle, and to join the digital arteries of the thumb. But this branch takes its rise directly from the radial, and is to be regarded as nothing more than the small artery which usually occurs in the same

situation, enlarged beyond the size it commonly has—plate 46, figures 2 and 4, and plate 40, figure 1.

In a few instances I have seen the posterior division of the anterior interosseous artery supply, to a greater or less extent, the place of the posterior carpal and metacarpal branches—one case presenting a very unusual degree of this conformation, is figured in plate 44. There the interosseous takes the place of the absent branches of the radial, and strengthens the main vessel by yielding to it a considerable addition.

The deep palmar arch, and the arteries of the thumb and index finger, will be considered in connexion with the other arteries of the hand.

ULNAR ARTERY.

The ordinary disposition of this artery is exhibited in plate 38, figures 1 and 2, and plate 39, figure 1; and it may be briefly stated as follows. After arising opposite or a little below the bend of the elbow*, the artery inclines obliquely inwards under cover of the superficial pronator and flexor muscles, and having come into contact with the ulnar nerve above the middle of the fore-arm, it is then directed vertically downwards, in company with the nerve, and by the side of the flexor carpi ulnaris muscle, to the palmar surface of the hand.

The branches given in this course are the anterior and posterior recurrent, and the interosseous, with small muscular and carpal arteries. The further distribution of the ulnar artery will be commented on at the same time with the other branches furnished to the hand.

The prevalence of the conformation above described, and the frequency of deviation from it, may be thus stated from the table.

The number of instances in which the condition of the artery is recorded is	Right side	225
	Left	197
		422
It had the usual disposition in	Right—204	
	Left —177	
		381
And deviated in some respects from it in		41, or 1 in nearly $10\frac{3}{10}$

* See the observations on the division of the brachial artery in a former page of this work—260.

The deviations from the usual disposition will be arranged under the following heads :—

A. The origin.

B. Position and direction.

C. Size.

D. The branches.

E. Peculiarities of the muscles in the immediate neighbourhood of the artery.

A. The place of origin of the artery was noted—in . { Right side 227 / Left 195 } —— 422

It was found to arise in the usnal position in { Right— 208 / Left — 182 } —— 390

above that point in . { R. 19 / L. 12 } —31

below it in . . L. 1

The origin deviated from the usual position in . . — 32 { about 1 in $13\frac{2}{11}$.

The following is the analysis of the cases in which the artery took its rise above the bend of the elbow.

It was given from the axillary artery in . . . { R. 2 / L. 6 } — 8

from the brachial near its beginning . { R. 5 / L. 1 } — 6

from the same artery at the middle . { R. 1 / L. } — 1

from the same, near its lower end . { R. 11 / L. 5 } —16

—23

—31

The variations that occur in the point of origin when it is higher than the usual position, are illustrated in plate 32 ; and the single case in which the vessel was observed to arise lower than usual, is represented in plate 35, figure 4.

B. *Position and direction.*—Where its origin occurs in the usual situation, the ulnar artery has little tendency to depart from the common course. I have, however, in more than one instance, seen it separated from the flexor carpi ulnaris by a considerable interval in the whole length of the fore-arm—

arriving at its ordinary position for the first time on the carpus—plate 43, figure 3. With respect to the case figured in the plate, it is to be observed, that a large median artery makes a very unusual curve to perforate the median nerve, and that there may possibly be some connexion between this circumstance and the direction of the ulnar artery.

When the artery arises higher than usual—and the remaining observations will have reference to it only when such is the case—it almost invariably deviates largely from the usual position in the fore-arm. The peculiarities that occur in the upper-arm, having been already noticed under the head of the brachial artery (page 263), attention will here be restricted to the course along the fore-arm. I shall consider the variations in position with reference to the muscles and to the fascia.

The origin being above the ordinary position—the vessel is almost invariably situated over the superficial muscles of the fore-arm. With so much constancy is it thus placed that I have never in more than a single example (plate 36, figure 2) found the artery covered by the muscles.

Most commonly the ulnar artery lies beneath the fascia, between it and the muscles: as represented in plate 32, figures 1, 2, and 3. Only three instances have occurred under my observation in which it was altogether subcutaneous. Two of these are delineated in plate 36, figure 1: and plate 41, figure 3. The third was noticed in a living person. I have observed some cases in which the position of the vessel, with respect to the fascia, partook of the condition of both those just mentioned, and was different from either. In this class of cases, the vessel lies over the fascia opposite the bend of the elbow, and for a small extent of the fore-arm, but is covered by the membrane in the rest of its course—plate 41, figure 2. Five examples of this arrangement are mentioned in the table, and I have noticed a greater number. It is a condition easily recognised during life. In one arm of a young friend of mine, a member of the medical profession, the ulnar artery can be readily distinguished immediately beneath the skin, at the upper part of the fore-arm; but after the passage of a few inches, it ceases to be distinguishable in

the same manner, obviously because of being more firmly bound down by sinking beneath the fascia.

Having so far considered the variations that occur in the position of the ulnar artery, with respect to the fascia and to the muscles, the line of direction it follows comes next for observation. When placed over the muscles, (the deviation observed in its direction, when under the muscles, has been mentioned at the beginning of this division of the commentary,) the ulnar artery varies in the point at which it begins the course along the fore-arm. If the origin be immediately above the usual position, the artery crosses the pronator teres opposite the middle of the bend of the elbow, or nearly so—plate 32, figure 3, and plate 41, figure 3. On the other hand, when the origin is situated at some distance higher in the arm, the vessel not unfrequently commences its course in the fore-arm considerably nearer to the inner margin of the limb, as is shown in plate 32, figures 1 and 2, and in plate 41, figure 2.

In its course downwards, the vessel for the most part inclines gradually to the flexor carpi ulnaris and the ulnar nerve. But a different disposition occasionally obtains. Thus, I have in at least two instances, (a drawing of one of them is now before me,) seen it directed nearly midway between both sides of the limb, and along the inner margin of the flexor carpi radialis to within little more than two inches of the wrist. At this point, the artery, changing its course, turned transversely inwards to the usual position, and then inclined downwards in company with the ulnar nerve, having formed two nearly right angles. I once noticed the same disposition in a living person an old female, in University College hospital, and I observed that in her arm the angles of the artery were alternately increased and diminished—the vessel being, in fact, plainly seen to become alternately more and less straight. In the last case, the artery was altogether subcutaneous; in each of the others, it was covered by the fascia.

Occasionally the artery does not approach the flexor carpi ulnaris till it is arrived at the carpus. This fact was well illustrated in the arm, of which a representation is given in plate 44, figure 2.

C. *The Size.*—The ulnar artery, when disposed in the usual manner, always loses much of its size by giving off the interosseous. It has the same diminished size from the origin when this occurs above the bend of the elbow, or when the vessel lies over the muscles of the fore-arm; for in such cases the interosseous is never, as far as I know, a branch of the ulnar artery. A similar effect is produced, — without any change in the place of origin—by the transfer of the interosseous to another artery. But the ulnar, "strictly so called," —as Dr. Barclay used to name the artery apart from the interosseous,—is sometimes found to have less or more than the ordinary dimensions. Without dwelling on constantly occurring minute shades of difference, it may be mentioned that the vessel is occasionally found to be so small as to afford few or nearly none of the branches ordinarily derived from it; or, on the other hand, it may be so large as to take the place of a defective radial artery. A decided decrease of size is more frequently met with than the opposite; and when it occurs, the arterial supply is derived from sources that vary in different cases. 1. The source from which the deficiency is most frequently supplied is the radial artery. Illustrations of several forms of branches of this artery substituted for the ulnar will be found in the forty-sixth plate, and a detailed reference to them is contained in the observations on the arteries of the hand. 2. The median artery occasionally yields assistance to the ulnar in the hand; a statement of the manner in which it is afforded is contained in the observations on that vessel. 3. Lastly, I have found a slender ulnar artery directly joined by a branch of the anterior interosseous, and thereby increased to the ordinary dimensions: see the notice of the interosseous artery and plate 44, figure 2.

Rarely does the ulnar exceed the common size, and take the place of the radial to any extent deserving notice. A well-marked instance is, however, shown in plate 46, figure 8*.

D. *The Branches.*—The branches to be noticed in this place are those given in the fore-arm; the palmar and digital branches will be associated with the other arteries of the hand.

* The observations made on the connexion between the radial and other arteries (p. 322) apply equally to the ulnar artery.

Anterior recurrent: posterior recurrent. The usual arrangement of these branches will be found in plate 39, figure 1, and plate 42, figures 1 and 2. They sometimes are derived from a common trunk, instead of arising singly from the ulnar artery; and when this artery takes origin above the ordinary situation, the recurrent branches are given by the interosseous—plate 33, figure 1: 43, figure 2, and 44, figure 2. In the single example of the arteries of the fore-arm arising below their ordinary position, the recurrent branches were derived from the brachial artery; and I have occasionally seen them, or one of them, arise above the elbow-joint and descend to be distributed in the usual manner—plate 43, figure 2.

Interosseous.—For the usual arrangement of this artery and its branches, see plate 39, figure 1, and plate 40, figure 1. There is generally a single vessel, which divdes into the anterior and posterior branches as represented in the former of the two plates referred to, but occasionally the branches are given singly from the ulnar artery.

The most important deviations from the ordinary disposition, are, 1st, those affecting the origin, and in connexion with it, the course; 2ndly, those in which some unusual branches are concerned.

Origin. The most frequent change in the mode of origin of the interosseous accompanies the alteration in the point at which the ulnar artery arises; for when this vessel is given above the usual position, the interosseous is transferred (so to express the fact of their connexion) to the radial artery *. But a more extensive alteration of the place of origin remains to be noticed. The interosseous is occasionally found to emanate from the axillary or the brachial artery. Four examples of such a change of the origin are mentioned in the table; the interosseous being in one of them derived from the axillary, in the others from the brachial artery. I have observed one other case in which the interosseous artery was given by the axillary, and two in which it proceeded from the brachial artery †.

* Plate 32, figures 1, 2, 3; plate 36, figures 1 and 2.

† Plate 33, figures 1, 2, and 3; plate 35, figure 4; plate 44, figure 1. The interosseous artery will be seen to arise from the end of the brachial artery in the last three figures.

The course the artery follows along the upper arm in the cases just noticed, has been referred to in the comments on the brachial artery (page 263). It is illustrated in plate 33, figures 1, 2, 3 : plate 41, figure 5, and in plate 43, figure 2.

Branches of the interosseous artery. Few variations requiring observation in consequence of practical importance occur in the ordinary branches, and I have only to observe with respect to them that in one instance I saw the place of the interosseous recurrent taken by a branch of the radial recurrent, and that the anterior interosseous artery, after reaching the back part of the fore-arm, sometimes furnishes the branches to the back of the hand.

I observed that when the interosseous artery was given off from the axillary, it furnished the branches of the shoulder and the arm; namely, the subscapular, the circumflex, and the profunda arteries—plate 33, figure 1. This occurred in both the cases that fell under my observation.

To another class of branches, occasionally found to arise from the interosseous artery, considerable interest attaches. Some variety exists in the cases now referred to, but they have this in common, that in every instance the unusual branch aids the radial or the ulnar artery, compensating for the small size of the one or the other of these vessels. The branch most frequently met with descends to the hand to join the palmar arch, or to take the place of some of the offsets of that artery. It will presently be noticed more at length under the name "median artery." The other forms of the peculiarity now under observation, consist in the anterior interosseous giving a branch to join directly a slender radial or ulnar artery. In one case, the branch passes from the anterior interosseous outward, between the pronator quadratus and the radius, and joins the radial artery; in another, the reinforcing branch, "mutatis mutandis," has a similar course to the inner side of the fore-arm to join the ulnar ; in a third the posterior division of the same vessel gives a thick branch to join the radial artery on the dorsal surface of the hand. These varieties of conformation are represented in the forty-fourth plate. I have seen but another example of a similar arrangement, and it differed in no respect from that delineated in the

first figure of the plate to which reference has been made. Trew* and Dr. Green† have each described the communicating branch given from the anterior interosseous to the radial artery in front of the fore-arm.

The disposition of the arteries in some of the cases which have now been mentioned, may be regarded as a transition to an arrangement observed by Otto, and previously noticed in this work (page 321)—that namely in which the radial artery having been altogether wanting, the interosseous, inclining outwards, in front of the lower end of the radius, was found to take its place.

Median artery. The artery thus named, because of its course in the middle of the fore-arm with the median nerve ‡, is noted in the table as having been present in twenty-four arms. It is derived from the anterior interosseous or the ulnar artery—most frequently from the former,—and, accompanying the median nerve, reaches the hand beneath the annular ligament of the carpus §. See plate 43, figure 3, plate 44, figures 1 and 2, and plate 46, figures 1 and 2. In each of two instances I found a slender branch given from the brachial; which, from the latter part of its course, might be considered a "median" artery. This little vessel, after arising, as stated, from the brachial, lay over the muscles of the fore-arm and descended to the hand beneath the anterior annular ligament of the carpus. One of the examples of this peculiarity occurred in the body of a very young child; the other is delineated at plate 45, figure 1.

The median artery varies in its mode of termination. In

* The radial artery arose high in the arm, and received two communicating branches—one at the bend of the elbow, from the brachial (ulnar-interosseous), the other near the wrist, from the anterior interosseous. The author gives a sketch of the vessels, adding, "ut autem et hæc (the high division, &c.) melius intelligi queant, in gratiam eorum quorum ea scire interest, similis distributionis, ob varias præterea anastomoses memorabilis, delineationem fieri curavi." "Commerc. litter. Noric." 1737. Hebd. 24.

† "An Account of the Varieties," &c., page 21, and Tab. 4, figure 6.

‡ "Arteria interossea superficialis, quæ non inepte mediana vocari potest, quia nervum medianum comitatur."—Tiedemann. "Explicat. Tab. xvi." p. 191.

§ The sixteenth plate of Professor Tiedemann's work contains two figures in which the median artery is shown. And in both it is made to cross in front of the annular ligament. M. Bourgery (T. iv., fig. 2 and 6) gives two similar figures, which have apparently been copied from Tiedemann.

Now, I have never seen the median artery so placed with reference to the annular ligament, and I am inclined to regard the representations referred to as, in that respect, erroneous.

a great majority (nineteen) of the cases set down in the table, it was found to join the superficial palmar arch (plate 43, figure 3, and 44, figures 1 and 2). And in the remaining number (five) it supplied the fingers, or joined digital branches derived from another source—plate 46, figures 1 and 2. See the remarks on the arteries of the hand.

E. *Peculiarities of muscles in the immediate neighbourhood of the artery.*—I have in a few instances found the ulnar artery covered by muscle for some distance above the carpus. The extent to which the vessel was thus covered varied from two to four inches. The disposition of the unusual muscular fibres was not the same in different cases; but the arrangement I most frequently met with (it occurred in three cases) resembled that delineated in plate 45, figure 2. The manner in which the muscular fibres terminated in this case is mentioned in the explanation of the plate (p. 314). I have seen them end differently, having been attached in parts to the deep layer of fascia that separates the flexor carpi ulnaris from the flexor profundus, and partly to the annular ligament and the muscles of the little finger. These peculiar muscles might be regarded as a modification of the second palmaris longus—a slender bundle of muscular fibres unconnected with the ulnar artery, of which I have repeatedly seen examples. The unusual muscle is said in the table (No. 242) to have reached in one instance from the ulnar to the muscles of the little finger.

THE ARTERIES OF THE HAND.

The arteries of the hand which it is proposed to review in this place are, the superficial palmar arch, the deep palmar arch and the digital branches. The carpal and metacarpal branches have already been noticed at sufficient length for the purposes of this work.

The superficial palmar arch or artery crosses the hand from the inner towards the outer side, lying beneath the palmar fascia, and in front of the tendons of the flexor muscles. It is generally formed by the ulnar artery, with a communicating branch from the radial.

There are numerous varieties as to the mode of connexion with the radial artery. Thus *a.* the superficial palmar artery, is

frequently joined by the superficial volar (plate 45, figure 3, and plate 46, figure 4) ; and this arrangement is described by several anatomical writers as that which generally prevails. But it has been shown in the account previously given of that branch, that the superficial volar is in a majority of bodies a very small branch, and is expended in the muscles of the thumb ; at least such is the result of the examination of a large number. Moreover, when of considerable size, it has not invariably a direct connexion with the superficial arch (plate 45, figure 4). *b*. A large branch of the radial is occasionally found to emerge from between the thumb and the index finger, and to form the medium of communication with the ulnar artery (plate 46, figure 3). *c*. But the connexion is with most frequency effected by means of a small branch directed transversely from among the muscles of the thumb. One form of such a branch will be found in plate 38, figure 2.

Such are the most important of the modes of connexion between the radial artery and the superficial branch of the ulnar. It must be added that cases sometimes occur in which no communication exists between the arteries in this situation. The absence of communication is shown in plate 45, figure 4, and plate 46, figures 1 and 2.

When a median artery exists, it perhaps most commonly joins the upper part of the superficial arch, in the manner shown in plate 45, figure 1 ; but the instances are not of rare occurrence in which this artery takes the place of a branch from the radial, in completing the superficial arch at the outer side. This disposition of the median artery is shown in plate 43, figure 3, and plate 44, figure 2.

The size of the superficial arch is very various. In one case it is sufficiently large to supply all the digital arteries*; in another, on the contrary, it is so small† as scarcely to furnish a digital branch. Between these extremes there are many intermediate degrees of size, as will be seen on reference to the forty-fifth, the forty-sixth, and other plates.

Lastly, the arch may in some instances be said to be altogether wanting. This occurs when the principal arteries

* Plate 43, figure 2, and plate 44, figures 1 and 2.
† Plate 46, figure 4.

divide without any approach to a transverse direction, or when the branches usually given from the arch emerge at various points, and in such a manner, that though the digital branches are present in the usual number, an arch cannot be said to exist. Cases illustrative of this statement are represented in plate 45, figure 4, and plate 46, figure 2.

The deep palmar arch is placed transversely behind the tendons of the flexor muscles, and lies higher or nearer to the carpus than the superficial arch *. It is derived from the radial artery, with very rare exceptions, and is joined on the inner side by a branch of the ulnar—or perhaps it would be more correct to say of many cases, that the deep arch is continued into the ulnar artery on the inner side of the hand, inasmuch as there is no difference of size or other mark, by which to be guided in determining the extent of the arch to be assigned to each artery. The communication between the deep arch and the ulnar artery is, however, often effected by means of a small branch †, and this, according to the usual manner, may be said to spring from the last-named vessel.

The size of the deep arch is occasionally diminished below the ordinary condition, but it is more frequently augmented, and compensates for deficiency in the superficial arch. An example of the latter kind is represented in plate 46, figure 7. The radial artery, however, rarely furnishes so many of the branches ordinarily given from the ulnar as it is seen to do in this drawing.

I have in a few instances observed the deep palmar arch to emanate from the ulnar artery, the radial being of extremely small size. This rare peculiarity is exemplified in the eighth figure of the plate last referred to.

The digital arteries.—It is with sufficient general correctness stated in anatomical works, that the superficial arch furnishes the digital arteries to three fingers and a half, reckoning from the inner side, and that the radial artery supplies the thumb and one side of the index finger ‡.

But the deviations from this arrangement are numerous and of various kinds. For convenience' sake, they will be arranged

* Plate 39, figure 2. † Plate 46, figures 1, 3, 4, and 7.
‡ Plate 38, figure 2, and plate 39, figure 2.

in two series; the first to comprise the peculiarities of the branches usually derived from the superficial arch; the second to include the variations of the arteries of the thumb and the radial side of the index finger.

1. The peculiarity most frequently met with in this series is the substitution of a branch or branches from the deep arch for one or more of those generally given from the superficial one. The radial artery, or deep palmar arch, is mentioned in the table to have furnished one or more digital arteries in fifty-one cases, which were disposed as follows:—

The entire number	Right side	29	
	Left	22	
		—	51
One digital artery * was given in . .	R.	16	
	L.	19	
		— 35	
Two in	R.	5	
	L.	0	
		— 5	
Three † in	R.	5	
	L.	3	
		— 8	
Four ‡ in	R.	3	
	L.	0	
		— 3	
		——	51

The digital arteries are also supplied, but with less frequency, from other sources. These may be enumerated as follows:—the superficial volar §; a metacarpal branch from the back of the hand ‖; a branch given by the radial artery in the same place as the deep arch ¶; and the median artery as shown (at least in part) in the second figure of the forty-sixth plate.

2. The principal sources from which digital arteries are given to the thumb and the outer side of the index finger, in the place of those they ordinarily receive, are the following:—the superficial palmar arch, which may be found to supply all the fingers**; the superficialis volæ, giving now one digital branch, and in another case a different one††; the median artery‡‡; lastly, a metacarpal branch §§, given on the back of the hand from the radial as it is about to pass forward in the first interosseous space.

* Plate 45, figure 5; and plate 46, figure 2.
† Plate 46, figures 3 and 4.
‡ Plate 46, figure 7.
§ Plate 45, figure 4.
‖ Plate 43, figure 1; and plate 46, figures 5 and 6.
¶ Plate 46, figure 3.
** Plate 43, figure 2; plate 44, figures 1 and 2; and plate 45, figure 1.
†† Plate 45, figures 5 and 6.
‡‡ Plate 44, figure 1; and plate 46, figure 1.
§§ Plate 43, figure 1; and plate 46, figures 2 and 4.

EXPLANATION OF PLATE XLVII.

This plate is intended to exhibit the thoracic or descending aorta with the intercostal arteries. The shoulders and arms were removed. The walls of the chest and abdomen, including the diaphragm, having been divided, the anterior part was taken away to a large extent. At the same time, the heart, the lungs, part of the œsophagus, and the viscera of the abdomen were removed. Further, the pleura was stripped from the ribs and intercostal muscles of the right side, and that membrane was dissected for a short space from the same parts near their cut margin on the left side.

The left intercostal arteries were but obscurely seen because of the left side of thorax having been in deep shadow, especially near the aorta and the vertebral column.

The body was in the sitting posture while the drawing was being made.

a Sterno-cleido-mastoid muscle of the right side.
a† Sterno-cleido-mastoid of the left side.
b Sterno-hyoid of the right side.
b† Sterno-hyoid of the left side.
c Thyroid body.
d Trachea.
d† Right bronchus.
d‡ Left bronchus.
e Anterior scalenus muscle of the right side.
e† Anterior scalenus of the left side.
f Posterior scalenus.
g Œsophagus.
h Diaphragm.
i Pleura.
k Right kidney.
k† Left kidney.

ARTERIES.

1. Arch of the aorta.
2. Descending or thoracic aorta.
3. Innominate.
4 Right carotid.
4†. Left carotid.
5. Right subclavian.
5†. Left subclavian.
6. Thyroid axis.
7. Internal mammary.
8. This mark is placed on some of the aortic intercostal arteries of the right side.
8†. Superior intercostal of the right side.

9. "Vena azygos."
10. Thoracic duct.

EXPLANATION OF PLATE XLVIII.

a Right ventricle of the heart.
a† Left ventricle.
b Right auricle.
b† Left auricle.

ARTERIES.

1. Arch of the aorta.
2. Descending or thoracic aorta.
2′. The same viewed from behind.
3′. Abdominal aorta viewed from behind.
4. Right coronary.
4†. Left coronary.
5. Innominate.
5′. The same viewed from behind.
6. Left carotid.
7. Left subclavian.
8. First aortic intercostal and last lumbar.
8′. The same viewed from behind.
9. Right bronchial.
10. Œsophageal.
11. Phrenic.
12. Cœliac axis.
13. Coronary.
14. Hepatic.
15. Splenic.
16. Superior mesenteric.
17. Capsular—artery of the suprarenal capsule.
17′. The same seen from behind.
18. Renal.
18′. The same viewed from behind.
19. Spermatic.
20. Inferior mesenteric.
21. Middle sacral.
21′. The same viewed from behind.
22. Common iliac.
23. Pulmonary.
23†. Right pulmonary.
23‡. Left pulmonary.

VEINS.

24. "Vena cava inferior."
24′. The same viewed from behind.
25. Hepatic.
25′. The same viewed from behind.
26′. "Vena azygos" viewed from behind.
27. "Vena cava superior."
27′. The same viewed from behind.
28. Pulmonary of right side.
28†. „ of left side.

Figure 1 is intended mainly to show the coronary arteries. The heart and the large vessels connected with it were viewed directly in front during the delineation, and have been represented in their natural position. In order to display the left coronary artery, the pulmonary artery was divided near its origin, and the greater part of it was removed, together with the branches.

Figure 2. In this figure the heart and large vessels are viewed from behind. The pulmonary arteries and veins, and the "vena azygos," are here seen in addition to the parts represented in the foregoing figure.

Figure 3 is a representation of the aorta in its entire length, and of the commencement of the branches which take rise from it. The aorta having been viewed directly in front, and in its natural situation on the vertebral column, the intercostal arteries of the left side were not seen near their origin, owing to the circumstance of their being concealed for some space by the great vessel from which they arise. Those of the right side on the contrary were prominently in view on the bodies of the vertebræ.

Figure 4. The aorta being removed from its natural connexions, is here represented on its posterior aspect. And the branches, whose origin become visible in such a view, are likewise shown; but a small portion, however, of each being included. The branches are the intercostal, the lumbar, and the middle sacral, springing from the back part of the great artery, with the renal and capsular, taking rise from its lateral aspect.

EXPLANATION OF PLATE XLIX.

In this plate, the arteries of the stomach and the liver are represented without the removal or displacement of any of the organs.

To exhibit the parts as they are here seen, the wall of the abdomen was in great part removed, and in order to show more fully the viscera at the upper part of the abdominal cavity, the entire margin of the chest was cut away. Some of the divided ribs and other structures are visible below the fore-arm on the right side; the rest were entirely concealed by the fore-arms—these having been, with that intention, held in the position in which they are drawn. The stomach and intestines were slightly inflated; and the liver having been held up by means of hooks, dropped into the shape that is represented.

The body was supported in the erect position during the preparation of the drawing.

a Diaphragm.
b Liver.
b† " Lobulus Spigelii " of the liver.
c Gall-bladder—in this case connected to the colon by a fold of peritoneum *.
d Stomach.
e Spleen.
f Great omentum.
f† Great omentum allowing the transverse colon to be seen behind it.
g Rectus muscle.
h Pancreas.
i A fold of the peritoneum connecting the gall-bladder to the colon*.

ARTERIES.

1. Cœliac axis.
2. Gastric :—Coronary of stomach.
3. Hepatic.
4. Splenic.
5. Gastro-duodenal.
6. Pyloric branch.
7. Cystic.
8. Gastro-epiploic of the right side.
9. Gastro-epiploic of the left side.

VEINS.

10. " Vena portæ."
11. " Vena cava."

BILE DUCTS.

12. Hepatic duct.
13. Cystic duct.
14. Common bile duct.—Ductus communis choledochus.

EXPLANATION OF PLATE L.

a Stomach.
b Duodenum.
c Part of the jejunum.
d Liver.
d† Gall-bladder.
e Pancreas.
f Spleen.
g Kidney of the right side.
g' Kidney of the left side.
h Portion of the large intestine—taken from the descending colon and the sigmoid flexure of the colon.

ARTERIES.

1. Aorta.
2. Gastric :—coronary of stomach.
3. Hepatic.
4. Gastro-duodenal.
4†. Gastro-epiploic of the right side.
4‡. Pancreatico-duodenal.
5. Splenic.
5†. Gastro-epiploic of the left side.
5‡. " Vasa brevia."
6. Superior mesenteric.
7. Inferior mesenteric.
7†. The part of the inferior mesenteric which descended to the pelvis (superior hæmorrhoidal).

* This fold of the peritoneum is often present, and varies somewhat in extent. It is distinctly a natural formation—not a false membrane. The layers of the serous membrane which compose it are continuous with the small omentum, and reach from the gall bladder to the colon and its peritoneal support. I have seen the fold fixed above to the liver instead of the gall-bladder—very close, however, to the latter.

The arrangement of this process of the peritoneum, its modifications, and the frequency of its occurrence, will be shown by my colleague, Mr. G. V. Ellis, who is engaged in making observations with respect to it.

VEINS.

8. "Vena cava inferior."
9. Portal :—"vena portæ."
10. Splenic.
11. Superior mesenteric.

Figure 1 continues the representation of the branches of the cœliac artery from the preceding plate. In order to display the arteries furnished to the spleen, the pancreas, the duodenum, and to the great curvature of the stomach, the last-named organ was held upwards from its natural position, and is so represented in the drawing.

Figure 2. In this outline, a part of the jejunum, and the arterial branches which supply it, are delineated with the intention of showing the mode in which the superior mesenteric artery branches, previously to entering the substance of the intestine, with more distinctness than could be done in the plate 51; in which the convolutions of the intestines partly conceal the small branches of the vessel.

Figure 3. With a like intention, a portion of the descending colon, and of its sigmoid flexure, is shown in connexion with the inferior mesenteric artery.

EXPLANATION OF PLATE LI.

The superior mesenteric artery and most of its branches are displayed in this plate. To obtain the view of the parts as they are represented, after the removal of the greater part of the wall of the abdomen in front, the colon was drawn into the position in which it is seen by means of strings. Those for the transverse colon were passed upwards through the fore part of the diaphragm and the parietes of the chest. The jejunum and ileon were folded so as to expose but a portion of the numerous arteries which supply them. And the peritoneum was removed from one side of all the vessels.

In consequence of the body having been placed in the erect position, the duodenum and both ends of the pancreas drooped downwards.

a Duodenum.
b Jejunum and ileon.
c Head of the colon :—caput cæcum coli. The vermiform appendage is seen to escape from its lower end.
c[1] Right or ascending part of the colon.
c† Transverse part of the colon.
c‡ Left or descending part of the colon.
d Pancreas.
e Transverse meso-colon.—One of its layers has been removed to expose the arterial branches.

ARTERIES.

1. Superior mesenteric. The numerous branches given from its left side to the jejunum and ileon are not distinguished by names. Some of them have been folded with the intestine to which they are distributed under the part which lies exposed.
2. Ileo-colic branch.
3. Right colic branch :—arteria colica dextra.
4. Middle colic branch :—arteria colica media.

5. Superior mesenteric vein.

EXPLANATION OF PLATE LII.

The distribution of the inferior mesenteric artery (except the pelvic portion) and some branches of the superior mesenteric, are here shown. The small intestines were turned to the right side in order to expose the end of the colon, and the

latter was held out as represented, to show the vessels more fully.

The peritoneum was removed from the lower surface of the branches of the superior mesenteric artery, and from the aorta the vertebral column, and the left lumbar and iliac regions. The kidney and ureter, with the psoas muscle of the left side, are indistinctly seen through a thick layer of laminated cellular membrane.

a Jejunum and ileon turned from the natural position on the left side.
b Duodenum drawn with the remainder of the small intestine to the right side.
c Right or ascending part of the colon.
*c*¹ Transverse part of the colon.
c† Left or descending part of the colon.
c‡ Sigmoid flexure of the colon.
d Transverse meso-colon.—One of the two layers of which it consists has been removed to display the arteries.
e Divided edge of the dense cellular membrane which lies behind the peritoneum. It was dissected from the aorta, to show that vessel more clearly.
f Kidney of the left side. It is covered by the membrane (*e*) and therefore indistinctly seen.
f† Ureter.
g Left psoas muscle, also covered in the same way.

ARTERIES.

1. Aorta.
2. Superior mesenteric.
2¹. Right colic:—arteria colica dextra.
2†. Middle colic:—arteria colica media.
3. Inferior mesenteric.
3¹. Left colic:—arteria colica sinistra.
3†. Branches to the sigmoid flexure of the colon—arteriæ sigmoideæ.
3‡. The continuation of the inferior mesenteric into the pelvis for the supply of the rectum:—superior hæmorrhoidal.
4. Left renal.
4†. Left spermatic.
5. Right common iliac.
5¹. Left common iliac.
6. Middle sacral.
7. Left epigastric.
8. Left common iliac vein.

EXPLANATION OF PLATE LIII.

It was desired to show the abdominal aorta and the origin of its branches, together with the iliac arteries. With this view the viscera of the abdomen were removed, with the exception of the kidneys and supra-renal capsules. The urinary bladder and the rectum occupy the pelvis.

The body having been viewed directly in front, the diaphragm was seen, as it is represented, to a small extent, fore-shortened, and for the most part in deep shadow.

a Diaphragm.
b End of the œsophagus.
c Kidney of the right side.
c[1] Kidney of the left side.
c† Ureter. The ureters are in this case seen to be furnished with their arteries from the renal and the common iliac.
c‡ Supra-renal capsule.
d Right psoas muscle.
d[1] Left psoas.
e Iliacus muscle of the right side, covered by the iliac fascia.
e[1] The same on the left side.
f Transversalis muscle cut to expose a branch of the circumflex-iliac artery.
g Rectus muscle. Its fibres are seen below the margin of its sheath.
h Rectum :—intestinum rectum.
i Urinary bladder.
k Vas deferens of the right side.
k[1] Vas deferens of the left side.

ARTERIES.

1. Aorta.
1†. Middle sacral.
2. Right phrenic, or diaphragmatic.
2[1]. Left phrenic.
3. Capsular :—artery of the supra-renal capsule.
4. Cœliac.
5. Coronary of the stomach :—arteria coronaria ventriculi.
6. Hepatic.
7. Splenic.
8. Superior mesenteric.
9. Right renal.
9[1]. Left renal.
10. Right spermatic.
10[1]. Left spermatic.
11 Inferior mesenteric.
12. Lumbar of the right side. A dash (') has been accidentally and erroneously added to the number affixed to the first of these branches.
12[1]. Lumbar of the left side.
13. Right common iliac.
13[1]. Left common iliac.
14. Right external iliac.
14[1]. Left external iliac.
15. Right internal iliac.
15[1]. Left internal iliac.
15‡. A branch of the ilio-lumbar.
16. Right epigastric.
16[1]. Left epigastric.
17. Obturator of right side.
17[1]. Obturator of left side.
18. Branches of circumflex-iliac :—arteria circumflexa ilii.

VEINS.

19. "Vena cava." | 20. Hepatic.

EXPLANATION OF PLATE LIV.

It is introduced to exhibit some of the arteries of the abdomen—those of the diaphragm and others—which could not be shown in the last plate.

The vessels represented here were unusually large. The body was that of a very tall man, in whom the arteries were naturally of more than ordinary dimensions. It should be mentioned, too, that they appeared to be fully distended with injection.

In order that the diaphragm might be drawn upwards and its arteries fully displayed, the sternum with the anterior part of the ribs was removed.

a Diaphragm.
b End of the œsophagus.
c Kidney.
c† Supra-renal capsule.
c‡ Ureter.
d Psoas muscle of the right side.
*d*¹ Psoas muscle of the left side.
e Quadratus lumhorum of the right side.
*e*¹ Quadratus lumhorum of the left side.
f One of the layers (the middle one) of those named "fascia lumhorum," continued from the transversalis abdominis muscle.
g Iliacus muscle of the right side.
*g*¹ Iliacus muscle of the left side.
h The highest part of the crest of the right iliac hone.
*h*¹ The same on the left side.
i Rectum:—intestinum rectum.
k Urinary hladder.
l Rectus abdominis muscle of the right side.
*l*¹ The same muscle on the left side.

THE ARTERIES.

1. Aorta.
2. Right phrenic.
2¹. Left phrenic.
3. Cœliac.
4. Right capsular:—artery of the supra-renal capsule.
4¹. Left capsular.
5. Superior mesenteric.
6. Right renal.
6¹. Left renal.
7. Spermatic.
8. Inferior mesenteric.
9. Lumhar.
9†. Branch of an intercostal artery.
10. Right common iliac.
10¹. Left common iliac.
11. Middle sacral.
12. Right external iliac.
12¹. Left external iliac.
13. Right internal iliac.
13¹. Left internal iliac.
14. Ilio-lumhar.
15. Epigastric.
16. Circumflex-iliac of the right side.
16¹. Circumflex-iliac of the left side.

17. The vena cava, cut at its passage through the diaphragm.

EXPLANATION OF PLATE LV.

In this plate the lower end of the aorta and the iliac arteries are shown in connexion with the veins by which they are accompanied, and some of the nerves. The intestines were removed to a sufficient extent to expose the vessels.

a Small intestine.
b Colon.
c Rectum.
d Ureter of the right side.
*d*¹ Ureter of the left side.
e Urinary hladder.
f Vas deferens.
g Right psoas muscle.
*g*¹ Left psoas.
h Iliacus.
i Highest part of the crest of the left iliac bone.

ARTERIES.

1. Aorta.
2. Inferior mesenteric.
3. Middle sacral.
4. Right common iliac.
4¹. Left common iliac.
5. Right external iliac.
5¹. Left external iliac.
6. Right internal iliac.
6¹. Left internal iliac.
7. This figure is placed on one of the spermatic veins. It was intended for the spermatic artery, which is close on the outer side.
8. Right epigastric.
8¹. Left epigastric.
9. Circumflex-iliac:—arteria circumflexa ilii.

VEINS.

10. "Vena cava."

The other veins are sufficiently distinguished by the arteries they accompany.

NERVES.

On the left side two nerves have been left. That which crosses the iliacus muscle, near the anterior end of the crest of the iliac bone, is the external cutaneous nerve of the thigh. On the psoas muscle is placed the genito-crural nerve. It divides into branches as it approaches the wall of the abdomen near the groin.

THE ABDOMINAL AORTA.—THE COMMON ILIAC ARTERIES.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
9	the lower margin of 4th vert.				
9a	the upper margin of 4th vert.				
15	the lower margin of 4th vert.				
19b	the lower margin of 2nd vert.	1½ inch above.	R	4	
19c	the mid. of 3rd vert.				
23a	between 3rd and 4th vert.				
25	the lower margin of 4th vert.				
27	between 3rd and 4th vert.		R	1½	
28	between 4th and 5th vert.				
29	between 4th and 5th vert.				
30	between 4th and 5th vert.				
30a	the mid. of 4th vert.				
31‡	between 4th and 5th vert.				
31a	between 4th and 5th vert.				
31†	between 4th and 5th vert.				
31f	between 4th and 5th vert.				
32	between 3rd and 4th vert.				
33	the mid. of 4th vert.				
33a	between 4th and 5th vert.				

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
34	between 3rd and 4th vert.		R		between 4th and 5th vert.
			L		between 4th and 5th vert.
34a	the mid. of 4th vert.				
35	between 4th and 5th vert.				
36	between 3rd and 4th vert.		R		between 4th and 5th vert.
			L		between 4th and 5th vert.
37	between 4th and 5th vert.				
37a	the upper part of 4th vert.				
40b	between 3rd and 4th vert.				
43	the mid. of 4th vert.		R		below sacro-iliac articulation.
			L		below sacro-iliac articulation.
45	the mid. of 4th vert.				
48	on the 4th vert.				
48a	the mid. of 4th vert.				
49	on the 4th vert.				
51	the mid. of 4th vert.		R	3	
			L	3	
52	between 4th and 5th vert.	opposite.	R	$2\frac{1}{4}$	
			L	$2\frac{1}{4}$	
53	between 3rd and 4th vert.	$\frac{1}{2}$ inch above.	R	3	opp. the mid. of 5th vert.
			L	$3\frac{1}{2}$	opp. sacro-iliac articulation.
54	the lower margin of 4th vert.		R	$2\frac{3}{4}$	
			L	$2\frac{1}{2}$	
55	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	R	3	
			L	$2\frac{1}{2}$	
56	the lower margin of 4th vert.		R	$2\frac{3}{4}$	between 5th vert. and sacrum.
			L	2	between 5th vert. and sacrum.
57	between 3rd and 4th vert.	$1\frac{1}{4}$ inch above.	R	2	between 4th and 5th vert.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$1\frac{3}{4}$	between 4th and 5th vert.
58	the mid. of 4th vert.		R	$2\frac{1}{2}$	below the mid. of 5th vert.
			L	2	
59	the upper margin of 4th vert.		R	3	
			L	$2\frac{3}{4}$	
60	the upper part of 4th vert.	opposite.	R	$2\frac{1}{4}$	opp. the upper margin of sacrum.
			L	$2\frac{3}{4}$	near mid. of iliac fossa.
61			R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
63	the lower margin of 3rd vert.		R	$2\frac{1}{2}$	
			L	$2\frac{3}{4}$	
64	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	R	2	on the mid. of 5th vert.
			L	$2\frac{1}{4}$	opp. the lower margin of 5th vert.
65	the lower part of 4th vert.	$\frac{1}{4}$ inch below.	R	$2\frac{1}{4}$	
			L	$2\frac{3}{4}$	
66	the upper margin of 4th vert.		R	$3\frac{1}{4}$	opp. the interval between 5th vert. and sacrum.
			L	$3\frac{1}{4}$	opp. sacro-iliac articulation.
67			L	3	
68	the lower margin of 4th vert.	$\frac{1}{2}$ inch below.	R	3	
			L	3	
69	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	R	$2\frac{1}{4}$	opp. the mid. of 5th vert.
			L	2	opp. the mid. of 5th vert.
70	between 4th and 5th vert.		R	2	
			L	2	
72	the lower margin of 4th vert.	1 inch below.	R	2	opp. the lower margin of 5th vert.
			L	2	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
73	between 4th and 5th vert.	$\frac{3}{4}$ inch below.	R	$2\frac{1}{4}$	
			L	2	
74	the lower part of 4th vert.	$\frac{1}{4}$ inch below.	R	3	
			L	$2\frac{1}{2}$	
75	the lower part of 4th vert.	opposite.	R	3	opp. the upper margin of sacrum.
			L	$2\frac{1}{2}$	opp. the upper margin of sacrum.
76	the upper part of 4th vert.	1 inch below (a deformed body).	R	$3\frac{1}{8}$	
			L	$2\frac{3}{4}$	
77	the lower part of 4th vert.	opposite.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
78			R	$3\frac{1}{2}$	
			L	3	
79	the upper part of 4th vert.	1 inch above.	R	3	
			L	3	
80	between 4th and 5th vert.	$\frac{1}{2}$ inch below.	R	$\frac{3}{4}$	
			L	1	
81	the lower margin of 4th vert.	$\frac{1}{2}$ inch below.	R	$2\frac{1}{4}$	
			L	$1\frac{1}{2}$	
82	opp. the upper margin of 5th vert.	$1\frac{1}{4}$ inch below.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
83	the mid. of 4th vert.	$\frac{1}{4}$ inch below.	R	3	
			L	$2\frac{1}{2}$	
84	the upper part of 4th vert.	1 inch above.	R	3	the mid. of 5th vert.
			L	$3\frac{3}{4}$	opp. interval between 5th vert. and sacrum.
85	the lower part of 4th vert.		R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
86	the upper margin of 5th vert.	$\frac{1}{2}$ inch below.	R	$1\frac{3}{4}$	
			L	$1\frac{1}{2}$	
87	between 3rd and 4th vert.	1 inch above.	R	$2\frac{1}{2}$	the mid. of 5th vert.
			L	$1\frac{1}{4}$	
88	the lower margin of 4th vert.	a little below.	R	2	
			L	$2\frac{3}{4}$	
89	the mid. of 4th vert.	$\frac{1}{8}$ inch below.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
90	between 4th and 5th vert.	1 inch below.	R	$1\frac{1}{2}$	
			L	2	
91	the upper part of 5th vert.	$\frac{1}{2}$ inch below.	R	$2\frac{1}{8}$	
			L	$2\frac{1}{2}$	
92	the lower part of 4th vert.		R	$3\frac{1}{4}$	
			L	3	
93	between 4th and 5th vert.	$1\frac{1}{2}$ inch below.	R	$3\frac{1}{2}$	
			L	$3\frac{1}{2}$	
94	between 4th and 5th vert.	$\frac{1}{2}$ inch below.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
95	the upper part of 4th vert.	$1\frac{1}{4}$ inch above.	R	$2\frac{1}{2}$	
			L	3	
96	the mid. of 4th vert.	opposite.	R	$2\frac{3}{4}$	
			L	$2\frac{1}{4}$	
97	the lower part of 4th vert.	opposite.	R	$3\frac{1}{4}$	
			L	3	
98	between 3rd and 4th vert.		R	2	opp. the interval between 4th and 5th vert.
			L	2	opp. the mid. of 5th vert.
99	the mid. of 4th vert.	opposite.	R	2	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$1\frac{3}{4}$	
100	the mid. of 4th vert.	opposite.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
101	the upper part of 4th vert.		R	$2\frac{1}{2}$	
			L	2	
102			R	2	
			L	$2\frac{3}{4}$	
103	the lower part of 4th vert.	$\frac{1}{4}$ inch below.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
104	between 4th and 5th vert.	a little below.	R	3	
107			R	$1\frac{1}{2}$	
			L	1	
108	the lower part of 4th vert.		R	$2\frac{3}{4}$	
			L	$2\frac{1}{2}$	
109			R	1	
			L	2	
111	between 4th and 5th vert.	$\frac{1}{4}$ inch below.	R	$2\frac{1}{2}$	
			L	2	
112	the upper part of 5th vert.	1 inch below.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
113	between 4th and 5th vert.	a little below.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
114	the mid. of 4th vert.	opposite.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
115	the mid. of 4th vert.	opposite.	R	$3\frac{1}{4}$	
			L	3	
115a	between 4th and 5th vert.	$\frac{1}{2}$ inch below.	R	2	
			L	$2\frac{1}{4}$	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
116	between 3rd and 4th vert.	$\frac{1}{4}$ inch below.	R	$2\frac{1}{2}$	
			L	$2\frac{3}{4}$	
117	between 3rd and 4th vert.		R	$3\frac{3}{4}$	
			L	4	
119	the lower margin of 3rd vert.		R	$3\frac{3}{4}$	below sacro-iliac articulation.
			L	$3\frac{3}{4}$	below sacro-iliac articulation.
120	the lower margin of 4th vert.		R	$3\frac{1}{2}$	
			L	$3\frac{1}{2}$	
121	the upper margin of 4th vert.		R	$3\frac{1}{2}$	
			L	$3\frac{1}{2}$	
122	the lower margin of 4th vert.	$\frac{1}{2}$ inch below.	R	2	opp. the lower part of 5th vert.
			L	2	opp. the lower part of 5th vert.
123	the lower margin of 4th vert.	$\frac{1}{2}$ inch below.	R	$1\frac{1}{2}$	
			L	$1\frac{1}{2}$	
124	the lower part of 4th vert.	a little below.	R	3	
			L	3	
125	between 4th and 5th vert.		R	1	
			L	$1\frac{1}{2}$	
127	the upper part of 4th vert.		R	3	opp. the interval between 5th vert. and sacrum.
			L	$3\frac{1}{4}$	lower than at the opp. side.
128	the upper part of 4th vert.		R	2	
			L	$1\frac{1}{4}$	
129	the upper margin of 5th vert.	1 inch below.	R	$1\frac{1}{2}$	
			L	1	
130	the lower margin of 4th vert.		R	$2\frac{3}{4}$	
			L	$2\frac{1}{4}$	
131	the lower part of 4th vert.	opposite.	R	$2\frac{1}{2}$	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$2\frac{1}{4}$	
133			R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
134	the upper part of 5th vert.	1 inch below.	R	2	
			L	$2\frac{1}{2}$	
135	the mid. of 4th vert.		R	$3\frac{1}{4}$	
			L	$2\frac{3}{4}$	
136	the mid. of 4th vert.	a very little above.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
137			R	$1\frac{3}{4}$	
			L	$2\frac{1}{4}$	
138	the upper part of 4th vert.		R	3	
			L	$2\frac{1}{2}$	
139	the lower part of 4th vert.	1 inch below.	L	3	
141	mid. 4 vert.	opposite.	R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
142			R	3	
			L	$3\frac{1}{4}$	
145	the upper margin of 4th vert.	1 inch above.	R	3	
			L	$2\frac{3}{4}$	
147	the lower margin of 4th vert.	opposite.	R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
149	the lower part of 4th vert.	$\frac{1}{2}$ inch below.	R	2	
			L	2	
150	the upper part of 4th vert.	$\frac{1}{4}$ inch above.	R	$2\frac{3}{4}$	
			L	$3\frac{1}{4}$	
151	between 4th and 5th vert.	a little below.	R	2	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	2	
152	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	L	3	
153			R	1	
			L	$1\frac{3}{4}$	
154	the upper part of 4th vert.	1 inch above.	R	$3\frac{1}{2}$	
			L	$3\frac{1}{2}$	
155	the upper part of 5th vert.	$2\frac{1}{4}$ inches below.	R	3	
			L	$3\frac{1}{4}$	
156	the mid. of 4th vert.	opposite.	R	$1\frac{1}{2}$	
			L	$2\frac{1}{2}$	
157	the upper margin of 5th vert.		R	$2\frac{1}{2}$	
			L	$2\frac{1}{2}$	
158	the mid. of 4th vert.	a little below.	R	$2\frac{1}{2}$	
			L	2	
159	the upper part of 5th vert.	$\frac{1}{2}$ inch below.	R	$1\frac{1}{2}$	
			L	$2\frac{3}{4}$	
161	between 4th and 5th vert.	opposite.	R	$1\frac{1}{8}$	
			L	$\frac{3}{4}$	
162	on the 5th vert.		R	$1\frac{1}{2}$	
			L	$1\frac{1}{2}$	
164	between 4th and 5th vert.	opposite.	R	$2\frac{1}{4}$	
			L	$1\frac{1}{2}$	
165	the lower part of 4th vert.		R	$3\frac{1}{2}$	
			L	3	
165*	between 4th and 5th vert.	1 inch below.	R	$1\frac{1}{2}$	
			L	2	
166	the lower part of 4th vert.		R	$2\frac{1}{2}$	
		$1\frac{1}{2}$ inch below.	L	$2\frac{1}{8}$	

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
168	the lower part of 4th vert.	opposite.	R	$2\frac{1}{4}$	besides a small br. to the glands it gives, near the end, a lumbar artery, which perforates the iliac vein.
			L	$1\frac{1}{2}$	
169	the mid. of 4th vert.		R	$1\frac{7}{8}$	
			L	$2\frac{1}{4}$	
169°	the upper margin of 3rd vert.	1 inch above.	R	3	
			L	$3\frac{3}{4}$	
170	the upper margin of 4th vert.		R	$1\frac{3}{4}$	
			L	$1\frac{3}{4}$	
172	the lower part of 4th vert.	a little below.	R	$1\frac{3}{4}$	
			L	$2\frac{1}{4}$	
173			R	$2\frac{1}{4}$	
			L	$1\frac{3}{4}$	
174	opp. the lower margin of 4th vert.	a little below.	R	$1\frac{3}{4}$	
			L	$2\frac{1}{4}$	
176	the upper margin of 5th vert.	$\frac{1}{4}$ inch below.	R	2	
			L	$2\frac{1}{4}$	
177	the upper margin of 5th vert.	$\frac{1}{2}$ inch below.	R	$1\frac{1}{2}$	
			L	$1\frac{1}{2}$	
178	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	R	$2\frac{7}{8}$	
			L	$3\frac{1}{2}$	
179			R	$1\frac{1}{2}$	opp. the mid. of 5th vert.
			L	$1\frac{1}{2}$	opp. the mid. of 5th vert.
180	the upper margin of 4th vert.	opposite. (In this body there are but 4 lumbar vertebræ).	R	$1\frac{5}{8}$	opp. the lower margin of 4th (last) vert.
			L	$1\frac{1}{2}$	opp. the lower margin of 4th (last) vert.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
181	the mid. of 4th vert.	nearly opposite.	R	$2\frac{3}{4}$	
			L	$2\frac{1}{2}$	
184	the lower part of 4th vert.		R	2	opp. the interval between 5th vert. and sacrum.
			L	$2\frac{1}{2}$	opp. the upper margin of sacrum.
185	the upper part of 4th vert.	$\frac{1}{2}$ inch above.	R	$2\frac{3}{4}$	opp. the lower margin of 5th vert.
			L	$2\frac{1}{2}$	opp. the upper margin of sacrum.
186	the lower margin of 4th vert.	$\frac{1}{2}$ inch below.	R	$1\frac{7}{8}$	the lower margin of 5th vert.
			L	$1\frac{7}{8}$	the upper margin of sacrum.
187	the lower margin of 4th vert.	opp. the mid. of iliac fossa. (The pelvis is much deformed).	R	$2\frac{1}{4}$	
			L	2	
188	the mid. of 4th vert.	a little below.	R	$2\frac{1}{4}$	
			L	2	
189	the mid. of 4th vert.	a little below.	R	$2\frac{1}{2}$	opp. the lower margin of 5th vert.
			L	$1\frac{3}{4}$	opp. the mid. of 5th vert.
190	the upper margin of 5th vert.	a little below.	R	$3\frac{3}{8}$	both divide in iliac fossa —the Right a little lower
			L	$2\frac{1}{4}$	than the Left.
191	the upper margin of 4th vert.	nearly opposite.	R	$2\frac{7}{8}$	opp. the lower margin of 5th vert.
			L	$2\frac{3}{4}$	a little lower than the Right.
192	the upper part of 5th vert.		R	$1\frac{1}{8}$	opp. the lower margin of 5th vert.
			L	$1\frac{1}{2}$	opp. the upper margin of sacrum.
195	the upper part of 4th vert.		R	$2\frac{3}{4}$	opp. the lower margin of 5th vert.
			L	3	opp. the interval between 5th vert. and sacrum.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium	Side of the Body.	Length in Inches.	Place of Division, &c.
196	the upper part of 4th vert.	$\frac{1}{2}$ inch above.	R	$1\frac{3}{4}$	opp. the upper part of 5th vert.
			L	$1\frac{3}{4}$	opp. the upper part of 5th vert.
199	the lower part of 4th vert.		R	$2\frac{3}{4}$	opp. the interval between 5th vert. and sacrum.
			L	$2\frac{1}{4}$	opp. the lower margin of 5th vert.
203	the mid. of 4th vert.	$\frac{3}{4}$ inch below.	R	$1\frac{1}{4}$	the mid. of 5th vert.
			L	$1\frac{1}{4}$	the mid. of 5th vert.
204			R	2	on the upper part of sacrum ; is tortuous.
			L	$1\frac{3}{4}$	opp. the upper part of sacrum.
205	the mid. of 4th vert.		R	$2\frac{3}{4}$	opp. the interval between 5th vert. and sacrum.
207	near the lower part of 4th vert.		R	$2\frac{1}{4}$	opp. the interval between 5th vert. and sacrum.
			L	$2\frac{1}{2}$	opp. the upper margin of sacrum.
208	the mid. of 4th vert.	a little below.	R	3	opp. the upper margin of sacrum.
			L	$2\frac{1}{4}$	opp. the upper margin of sacrum.
210	the upper part of 4th vert.	a little above.	R	2	opp. the mid. of 5th vert.
			L	2	
212	the upper part of 4th vert.	a little above.	R	$2\frac{3}{4}$	on the upper part of 5th vert.
			L	$2\frac{3}{4}$	on the mid. of 5th vert. (Both diverge less than usual).
213	the upper part of 4th vert.		R	$2\frac{3}{4}$	gives a small br. to the psoas muscle.
			L	$3\frac{1}{4}$	opp. the upper margin of sacrum gives a lumbar artery near its end, and a small br. to the cellular tissue.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
215	opp. the interval between 4th and 5th vert.	opposite.	R	$1\frac{3}{4}$	opp. the mid. of the interval between 5th vert. and sacrum.
			L	$1\frac{3}{4}$	opp. the mid. of the interval between 5th vert. and sacrum.
216	the upper part of 5th vert.	a little below.	R	$1\frac{3}{4}$	opp. the mid. of the interval between 5th vert. and sacrum.
			L	$2\frac{1}{4}$	below the upper margin of sacrum.
217	the upper part of 4th vert.	$\frac{1}{2}$ inch above.	R	$3\frac{3}{4}$	opp. the interval between 5th vert. and sacrum.
			L	$3\frac{3}{4}$	opp. the interval between 5th vert. and sacrum.
219	the lower part of 4th vert.		R	$2\frac{1}{4}$	opp. the upper margin of sacrum; gives a lumbar artery 1 inch from beginning.
			L	3	opp. the sacro-iliac articulation.
221	the lower part of 4th vert.	a little above.	R		opp. the lower part of 5th vert.; gives a br. to the psoas muscle.
			L		opp. the lower part of 5th vert.
222	the upper part of 4th vert.		R	$2\frac{3}{4}$	opp. the lower margin of 5th vert.
			L	$2\frac{3}{4}$	opp. the lower margin of 5th vert.
223	the lower part of 4th vert.	a little above.	R	$2\frac{1}{4}$	opp. the lower margin of 5th vert.; gives a lumbar artery near its lower end.
224	the lower margin of 4th vert.	1 inch below.	R	$1\frac{1}{2}$	above the lower margin of 5th vert.
			L	$1\frac{3}{8}$	above the lower margin of 5th vert.
225	the upper margin of 4th vert.	1 inch above.	R	3	opp. the interval between 5th vert. and sacrum.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$3\frac{1}{8}$	opp. the lower margin of 5th vert.
226	the lower part of 4th vert.		R	$2\frac{3}{8}$	opp. the lower margin of 5th vert.
			L	$2\frac{1}{8}$	opp. the lower margin of 5th vert.
230	the upper margin of 5th vert.	below.	R	$2\frac{1}{8}$	on the upper margin of sacrum.
			L	$2\frac{3}{8}$	opp. the upper margin of sacrum, (diverges more from the middle line of the body than the artery of the other side.)
233	above the lower margin of 4th vert.	a little below.	R	$1\frac{3}{4}$	opp. the lower part of 5th vert.
			L	$1\frac{7}{8}$	opp. the lower margin of 5th vert.
234	the upper part of 4th vert.	a little below.	R	$2\frac{1}{4}$	opp. the mid. of 5th vert.
			L	$2\frac{3}{8}$	
237	the upper part of 5th vert.	$1\frac{1}{4}$ inch below.	R	$2\frac{1}{4}$	opp. the sacro-iliac articulation.
			L	2	opp. the sacro-iliac articulation. Both arteries diverge widely.
238	the upper part of 4th vert.	opposite.	R	$3\frac{3}{4}$	opp. the upper margin of sacrum.
			L	$2\frac{3}{4}$	opp. the sacro-iliac articulation; is tortuous, and when uncoiled measures the same as the artery of the opp. side.
240*	on the 3rd vert.	2 inches above.	R	3	opp. the upper part of 5th vert.—close to its body.
			L	$3\frac{1}{4}$	on the upper part of 5th vert.
241	the upper part of 4th vert.		R	$1\frac{3}{4}$	on the upper part of 5th vert. at the middle line.
			L	3	opp. the upper margin of sacrum; is tortuous.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
242*	the mid. of 4th vert.	opposite.	R	$2\frac{3}{8}$	opp. the lower margin of 5th vert.
			L	$2\frac{3}{8}$	opp. the lower margin of 5th vert.
242	opp. the interval between 4th and 5th vert.		R	2	
			L	2	
243	the lower part of 5th vert.		R	$1\frac{3}{4}$	
			L	$2\frac{1}{4}$	is tortuous.
246	the lower part of 4th vert.		L	$3\frac{1}{4}$	over the larger sciatic notch; gives, near its origin, a br. to the psoas muscle, and another near its end to the iliacus.
247	a little above the upper margin of 5th vert.		R	$2\frac{3}{4}$	opp. the sacro-iliac articulation.
			L	$2\frac{1}{4}$	opp. the sacro-iliac articulation.
249	the upper part of 4th vert.	1 inch above.	R	$3\frac{1}{2}$	opp. the upper margin of sacrum.
			L	$2\frac{3}{4}$	opp. the lower part of 5th vert.
250	the lower part of 4th vert.		R	2	on the lower edge of 5th vert.; gives a small br. to the psoas muscle.
			L	$2\frac{3}{4}$	opp. the upper margin of sacrum; is tortuous, and diverges from the middle line of the body more than the artery of the opp. side.
251	the lower part of 4th vert.		R	$1\frac{1}{4}$	opp. the mid. of 5th vert.
			L	$1\frac{1}{2}$	above the lower part of 5th vert.
252	the mid. of 4th vert.	a little below.	R	$1\frac{1}{8}$	opp. the interval between 4th and 5th vert.
			L	$1\frac{1}{2}$	opp. the upper margin of 5th vert.
253	the upper part of 4th vert.		R	2	on 5th vert.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$3\frac{1}{2}$	opp. the sacro-iliac articulation.
256	the mid. of 4th vert.	above.	R	$1\frac{3}{4}$	opp. the interval between 5th vert. and sacrum.
			L	$1\frac{3}{4}$	close to the upper margin of sacrum.
257	the upper part of 4th vert.	a little below.	R	$4\frac{1}{2}$	opp. the upper margin of sacrum ; gives a br. to the iliac fossa.
			L	$4\frac{1}{4}$	at the sacro-iliac articulation. Both arteries are tortuous and seem forced with injection.
260	the mid. of 4th vert.	a little below.	R	3	opp. the upper margin of sacrum.
261	the mid. of 4th vert.	below.			
262	the upper part of 4th vert.	opposite.	R	$2\frac{1}{8}$	the mid. of 5th vert.
			L	$1\frac{5}{4}$	the mid. of 5th vert.
264	opp. the interval between 4th and 5th vert.	$\frac{1}{2}$ inch below.	R	$2\frac{3}{4}$	below the level of the upper margin of sacrum.
			L	$2\frac{3}{4}$	opp. the upper margin of sacrum.
267	the mid. of 4th vert.	opposite.	R	$1\frac{1}{2}$	on the 5th vert. at the middle line.
			L	$2\frac{1}{2}$	opp. lower margin of 5th vert. ; diverges from middle line more than the artery of opp. side.
268	the lower margin of 4th vert.	1 inch below.	R	$3\frac{1}{4}$	divides opp. the posterior margin of psoas muscle ; gives near its origin a br. to that muscle.
			L	$2\frac{3}{4}$	divides opp. posterior margin of psoas muscle ; gives at its middle a br. to that muscle. Both the arteries are tortuous.
269	the upper part of 5th vert.	$\frac{1}{2}$ inch below.	R	$2\frac{3}{4}$	close to the upper margin of sacrum.

No.	THE AORTA—ITS PLACE OF DIVISION,		COMMON ILIAC.		
	on the Lumbar Vertebræ.	with refer. to the highest part of the Crest of the Ilium.	Side of the Body.	Length in Inches.	Place of Division, &c.
			L	$2\frac{1}{4}$	opp. the upper margin of sacrum; diverges more than the artery of the opp. side.
271	the upper margin of 5th vert.		R	$1\frac{1}{8}$	on the lower margin of 5th vert.—gives a renal artery.
			L	$1\frac{3}{4}$	lower than the upper margin of sacrum.—gives a renal artery.
271*	the upper margin of 4th vert.	$\frac{1}{2}$ inch above.	R	$3\frac{3}{4}$	below upper margin of sacrum.
			L	$3\frac{3}{8}$	close to sacro-iliac articulation; diverges more than the artery of the opp. side.
281	the upper part of 4th vert.	opposite.	R	$2\frac{1}{2}$	the mid. of 5th vert.
			L	2	above the mid. of 5th vert.
284	the mid. of 4th vert.	a little below.	R	$3\frac{1}{4}$	opp. the upper margin of sacrum.
			L	$3\frac{1}{4}$	opp. the upper margin of sacrum; is tortuous.
287	the upper part of 5th vert.	a little below.	R	2	
			L	2	
288	the lower margin of 4th vert.		R	$1\frac{1}{2}$	opp. the mid. of 5th vert.
			L	1	opp. the mid. of 5th vert.

Abstracts of the foregoing table will be found in the observations on the aorta and the iliac arteries.

EXPLANATION OF PLATE LVI.

a Diaphragm.
b Stomach.
b† Œsophagus.
c An indication of the liver.
d Kidney.
e Fifth lumbar vertebra.
f Sacrum.
g Iliac bone.

ARTERIES.

1. Aorta.
2. Right phrenic.
2¹. Left phrenic.
2†. A branch given to the diaphragm from the left hepatic.
3. Cœliac.
4. Coronary—arteria coronaria ventriculi.
5. Hepatic.
5†. Right and left hepatic branches.
6. Splenic.
7. Superior mesenteric.
8. Right renal.
8¹. Left renal.
9. Right common iliac.
9¹. Left common iliac.
10. External iliac.
11. Internal iliac.
†. Ilio-lumbar.

The figures marked 1, 2, 3, are intended to illustrate the variations that occur in the place of division of the aorta. In the other figures some peculiarities of the branches are shown.

Figures 1, 2, 3. In two of the cases represented in these figures (the first and third) the lower end of the aorta lies in the middle line of the body; while in the other (second) it is placed considerably to the left of that point.

The division of the great artery occurs in different positions. Thus, in the first figure it divides on the third lumbar vertebra, considerably above the highest part of the iliac bone. In the second, the division is on the fourth lumbar vertebra, and slightly above the ilium; and in the figure marked 3, it is seen to be placed on the fifth vertebra, and below the level of the highest part of the ilium.

Figure 4 is an example of both phrenic arteries given from a single trunk, which derived its origin from the aorta above the margin of the diaphragm.

In figure 5, the phrenic artery arises from the renal on each side.

Figure 6. In this case there are several peculiarities of the branches. Besides the ordinary phrenic arteries—which are here derived from the cœliac by a common trunk—an additional (third) branch is furnished from the left hepatic. In

its course to the diaphragm this unusual branch was found to lie in apposition with the liver, immediately in front of the lobulus Spigelii.

The hepatic, instead of being a branch of the cœliac artery, is given from the superior mesenteric.

EXPLANATION OF PLATE LVII.

a Right kidney.
a[1] Left kidney.
a† Ureter.
a‡ Double ureter.

b Testis.
c Diaphragm.
d Lumbar vertebræ.

ARTERIES.

1. Aorta.
1†. Middle sacral.
2. Right phrenic.
2[1]. Left phrenic.
3. Coronary of the stomach.
4. Splenic.
5. Hepatic.
6. Renal.
7. Spermatic.
8. Common iliac.
9. External iliac.
10. Internal iliac.
†. Ilio-lumbar.
‡. A lumbar artery.
11. "Vena cava inferior."

In the first five sketches the illustration of the peculiarities which occur in the branches of the abdominal aorta is continued from the preceding plate. Some of the variations of the iliac arteries are represented in the other figures.

Figure 1. There are on each side three renal arteries. Those on the right side, where they cross the vena cava inferior, lie at different sides of that vessel—one being behind it, the other two in front.

The ureters happened, in the case here represented, to be double on both sides, and the two parts joined at unequal heights. The junction occurred, as shown, a little below the kidney on the right side, but on the left side the two tubes remained separate until they came into connexion with the bladder.

Figure 2 *. Five renal arteries occur on the left side. There existed but one on the opposite side.

* This sketch has been taken from a preparation in the museum of St. Bartholomew's Hospital.

The dilated part of the ureter (pelvis) is observed to lie on the anterior surface of the kidney, which in that situation presents an irregular depression.

Figure 3 *. The splenic, hepatic, and coronary arteries, instead of arising from a common trunk, are given singly from the aorta, and the cœliac axis or artery is therefore altogether wanting.

While the left kidney receives, as is most common, a single artery, that of the right side is furnished with four. Two of these require especial attention,—one being derived from the common iliac artery of the right side, above its middle: the other from the left common iliac, immediately at its origin from the aorta. The renal branch given by the right iliac artery crosses behind the kidney and enters the anterior surface of the organ, after turning round its outer margin.

Three of the right renal branches cross the vena cava in front, the fourth lies, with reference to the vein, in the position which the artery usually has when single, namely, behind it.

Both the kidneys were longer in proportion to the breadth, and were lower in the abdomen than usual. These remarks apply particularly to that of the right side, the lower end of which lay over the external iliac artery. It is to be observed that the peculiarities in the kidneys were more apparent in the recent body than they are shown in the drawing; for this was not made until the parts had shrunk in some degree, in consequence of being partially dried.

The ureter of the right side escaped from an irregular depression on the anterior surface of the kidney, somewhat as in the case represented in the preceding figure.

Figure 4 †. An irregularly-shaped and lobulated right kidney is seen to receive three arteries. One arises from the side of the aorta, at about the usual place; the second is given from the same vessel in a very unusual position—viz. from its fore-part and close to its bifurcation; the third deviates still further from the accustomed place of origin of renal arteries—being derived from the lower end of the common iliac.

* Taken from the case marked 271 in the table.

† Copied from Tiedemann's "Tabulæ Arteriarum," tab. 30.

Figure 5. The phrenic arteries arise by a common trunk from the aorta.

There are on one side three spermatic arteries; two of which are given from the aorta, and one from the renal artery.

Figure 6. Both common iliac arteries have more than the usual length. The left is the longer of the two, and it gives a lumbar artery from the lower end.

The internal iliac arteries are short, and from that of the right side near its origin the ilio-lumbar branch is given.

Figure 7. The aorta divides on the middle line of the vertebræ.

The common iliac arteries are short. Their division occurs opposite the upper part of the fifth lumbar vertebra. And they do not differ, one from the other, in length.

The internal iliac artery of the left side has more than the usual length. It lay for some space parallel with the external iliac before dipping into the pelvis.

Figure 8. The left common iliac artery is very short. The internal iliac of the same side is proportionably longer than usual.

Figure 9. The usual relative length of the common iliac arteries is reversed,—that of the left side being the longer, and to a considerable extent. The artery of the right side is remarkably short, and the internal iliac which springs from it is of much greater length than that vessel is commonly found to be.

EXPLANATION OF PLATE LVIII.

a Fifth lumbar vertebra.
b Sacrum.
c A small portion of the diaphragm.
d Heart—its anterior surface.
d† Heart—its posterior surface.
e Kidney.
e† Supra-renal capsule.
f Trachea—seen in front.
f† Trachea—seen from behind.

ARTERIES.

1. Arch of the aorta.
2. The descending or thoracic aorta, seen from behind.
3. Abdominal aorta.
3¹. Right common iliac.
3†. Internal iliac.
3‡. Two circumflex iliac.
4. Pulmonary.
4†. Right pulmonary—seen from behind.

VEINS.

5. Right innominate.
5¹. Left innominate.
5†. Part of left innominate, having a very unusual course. It continues around the left side of the heart to its posterior aspect, and enters the right auricle in connexion with the coronary vein.
6. "Vena cava superior."
7. "Vena cava inferior."
8. Right common iliac.
8¹. Left common iliac.
9. Left internal iliac.
10. Pulmonary.

The first figure continues the illustration of peculiarities of the iliac arteries, from the preceding plate.

In all the remaining figures, are represented variations of the veins from their ordinary disposition. These are drawn on a reduced scale, with the exception of the seventh figure.

Figure 1. The left common iliac artery is unusually long; the internal iliac, on the contrary, is very short. From the external iliac two branches arise in the place of the circumflex iliac artery.

Figure 2*. The common iliac veins join on the left side of the aorta, and the vena cava inferior continues on the same side for some space. After receiving the left renal vein, the vena cava crosses obliquely over the aorta, immediately below the superior mesenteric artery, to the usual position on the right side, and is joined by the right renal vein. Above the point at which it is represented in the drawing, the great vein was found to pass behind the liver and to perforate the diaphragm in the usual manner.

Figure 3. The vena cava inferior lies altogether to the left of the aorta. All the viscera were transposed in the body from which the drawing was made, and, the liver being on the left side, the hepatic veins joined the vena cava.

Figure 4. Here the lower part of the aorta is seen to lie between two large veins. The following is their arrangement. The left common iliac vein divides into two parts. One of these joins the common iliac of the right side; the other courses upwards on the left side, receives the left renal vein, and, after crossing over the aorta, joins the large venous trunk of the right side. The vena cava may properly be said

* The preparation represented in this drawing, was found by Mr. Fearnside and Mr. Charles Jones in the body of an adult.

to be formed at this point of junction, and it is therefore considerably shorter than usual.

Figure 5 is the representation of a case in which the right common iliac vein is double. The two parts lie in apposition one with the other, and the common iliac artery is partly in front of both.

Figure 6. There are two internal iliac veins on the left side, and the artery is placed between them.

The common iliac has a slight indication of division into two parts.

Figure 7. This plan is taken from one given by Herholdt*,—the kidney and an outline of the trunk of the body, which are given in the original, being omitted. It represents the disposition of the veins in a fœtus. The viscera having been transposed, the vena cava superior was placed on the left side, and the thoracic duct was directed to the right side of the neck. The trunk of the hepatic veins perforated the diaphragm on the left side, and, without communicating with the vena cava, terminated in the right auricle of the heart, as this large vessel is wont to do. The enlarged azygos vein, after having passed from the abdomen to the thorax in the same opening with the aorta, is said to have turned forward at its termination above the left bronchus.

The object proposed in the introduction of this figure, was to show the manner in which the inferior vena cava, formed on the lumbar vertebræ in the usual way, is occasionally continued upwards to join the superior cava through the medium of the vena azygos. As the example given from M. Herholdt was accompanied by transposition of organs, and the original drawing has not been made with as much care as was to be desired, I would have preferred to illustrate the point by copying one of the sketches given by Dr. Horner†, of a case observed by him, if the iliac veins had not been omitted from them.

* Beschreibung sechs menschlich: Misgeburten. Kopenhagen, 1830. Not having been able to procure the original work, I am indebted for the knowledge of the case, and for the figure, to an essay by Stark, entitled "Commentatio anatomico-physiologica de venæ azygos natura, vi atque munere.—Scripsit D. C. G. Stark.—Lipsiæ, &c."

† "A case of unusual arrangement of the ascending cava and the external jugular veins of the human subject, by Wm. E. Horner, M.D.," in the "Journal of the Academy of Natural Sciences of Philadelphia." Vol. i. page 401, 1817—18.

Figure 8. In the case sketched in this figure, as well as in the preceding, the inferior vena cava continued into the thorax, as the vena azygos, and the blood from it entered the heart through the vena cava superior. The hepatic veins opened into the right auricle of the heart in the usual situation of the inferior vena cava.

But there are in this case some remarkable additional peculiarities. The iliac veins remain separate, as high as the second lumbar vertebra, and they receive the renal veins, of which there are two on the right side, and one on the left. Moreover, the right iliac vein crosses behind the aorta to join the vein of the opposite side.

The vena cava inferior, resulting from the junction of the vessels just referred to, is placed to the left side of the aorta. It enters the thorax through the aortic opening, and after lying on the same (left) side for some space, crosses to the right side, behind the great artery and the thoracic duct, and joins the vena cava superior as the vena azygos usually does.

The intercostal veins were thus disposed:—On the right side the veins from the upper intercostal spaces formed a small common trunk, which joined the enlarged azygos. The lower intercostal veins were likewise joined into another small trunk, which terminated in the same way (see the figure); and it is to be inferred from the description, that the veins from the middle spaces—from the fifth to the eighth—opened directly into the large vein; which thus, mediately or immediately, received all the veins of the right side. The branches of the left side also ended in the same vein, with the exception of those belonging to the superior intercostal spaces.

This case was observed by Professor Otto of Breslau, in the body of a full-grown man. The account given of it here, and the figure have been taken from an essay by M. Gurlt *, in which it was originally described.

Figures 9 and 10 are a front and back view of a preparation illustrating a remarkable peculiarity of the veins through which the blood is conveyed from the upper part of the body

* "De venarum deformitatibus, adnexa venæ cavæ inferioris aberrationis rarioris descriptione &c., auctore E. T. Gurlt.—Vratislaviæ, 1819." A small part of the original figure has been omitted in our sketch.

to the heart. It occurred in the body of an adult, and was discovered and prepared some years ago by Dr. Sharpey*.

In this case the innominate veins, instead of joining to form a single trunk (vena cava superior), open separately into the right auricle of the heart. The vein of the right side follows the ordinary course of the vena cava. That of the left side, after sending a small transverse branch to the right in the course usually followed by the entire vein, descends vertically in front of the root of the left lung, and having turned round the left side of the heart to its posterior aspect, enters the right auricle in connexion with the coronary vein, (5† in figures 9 and 10).

EXPLANATION OF PLATE LIX.

The pelvic viscera of the female and their arteries are shown in this plate.

The process of dissection was, in so far as the pelvis was concerned, as nearly as possible the same as that described for the exhibition of the pelvic organs of the male;—see the explanation of the sixtieth plate. But the spine of the ischium was drawn down, for the plate before us, and it remained suspended by the coccygeus muscle and the sacro-sciatic ligament. The pudic artery was therefore divided.

The muscular and membranous structures which, in the natural condition, separate the pudic artery from the rectum, the vagina and the urethra, were removed in order to show those organs more clearly. This circumstance, and the fact that the vessel is removed from the organs referred to by an interval which gradually diminishes from behind forward—from the sacrum to the pubes—are not to be lost sight of when the drawing is under observation.

In order that the ovary, the Fallopian tube and the arteries, might be more fully exposed, the fold of peritoneum named the broad ligament of the uterus was cut away.

It may be observed that when the body was under prepa-

* The preparation is now in the Museum of Human Anatomy, in University College, having been presented to it by Dr. Sharpey.

ration, it was not intended to include in the drawing anything above the pelvis. To this circumstance must the irregular or jagged condition of the muscles of the abdomen be attributed; for they were divided carelessly and without any view to a representation of them.

a Left kidney. The kidney of the right side also is obscurely seen.
a† Left ureter.
b Sacrum.
b† The end of the coccyx.
c Left psoas muscle cut.
d Rectum:—intestinum rectum.
d† Rectum:—below the point at which the peritoneum is reflected away from it.
d‡ Sphincter ani.
e Left ovary—held up by means of a hook.
f Fallopian tube—turned forward on the urinary bladder.
g Round ligament of the uterus, cut.
h Uterus.
i Vagina.
i† Sphincter vaginæ.
k Urinary bladder.
l Crus clitoridis divided.
m Section of the left pubic bone.
n Spine of the left ischium hanging down and supported by the coccygeus muscle and the shorter sacro-sciatic ligament.

THE ARTERIES.

1. Aorta.
2. Ovarian. It runs on the margin of the ovary and anastomoses with a branch of the uterine artery.
3. Inferior mesenteric.
4. External iliac—cut close to its origin.
5. Internal iliac.
5†. Hypogastric—gradually losing its permeability and becoming a fibrous cord.
6. Uterine.
7. Vaginal.
8. Pudic. This artery was cut across and the greater part of it, together with the spine of the ischium, fell considerably below the natural level. The branches of the pudic artery delineated in this drawing are the following: viz., the hæmorrhoidal, the superficial perineal, with the cavernous and dorsal arteries of the clitoris.
9. Sciatic. The divided branch given from its upper part is a portion of the obturator artery.
10. Gluteal.
11. The lower end of the inferior mesenteric—superior hæmorrhoidal.
12. Sacral nerves.

EXPLANATION OF PLATE LX.

This plate contains a representation of the pelvic viscera of the male body, and of the arteries distributed to them.

The view was obtained by the removal of the os innominatum and the lower limb of the left side. In effecting this, the body of the pubes was sawed through, the ilium was separated from the sacrum, and the soft parts were divided in a manner which is sufficiently apparent on examining the plate.

For the purpose of preserving the pudic artery entire, the spine of the ischium—on the outer side of which it turns—was sawed off, and the fragment of bone was left connected to

the sacrum by means of the coccygeus muscle and the smaller sacro-sciatic ligament. And in order to show the branches of the same artery in connexion with the parts to which they belong, the levator ani muscle, with some fat and membrane, was removed from between the vessel on the one hand, and the rectum, the prostate gland, and the urethra on the other.

During the preparation of the drawing, the pudic artery was held by means of the hook at about the usual distance from the organs last named. But the space which intervenes between them, and the difference in its extent behind and in front, (caused by the approximation of the vessel to the middle line of the body as it approaches the pubes,) cannot be sufficiently marked, except in a view taken from the perineum; and for this, reference is to be made to the sixty-second plate.

a Psoas muscle of the left side, cut across.
b Sacrum—the articular surface for the iliac bone.
b† Coccyx.
c A small piece of the ischium sawed off with the spine of that bone. It is connected to the sacrum by the coccygeus muscle and the short sacro-sciatic ligament, and is supported by the pudic artery.
d The upper part of the rectum covered by peritoneum.
d† The lower part of the rectum on which the peritoneum does not descend.
e Peritoneum—where it is reflected from the wall of the abdomen to the urinary bladder. The membrane having been divided, the margin of the division is seen on the rectum and on the bladder.
e† Peritoneum—held up to show the ureter and the internal iliac artery.
f Urinary bladder.
f† Ureter.
g A section of the pubic bone, made at a short distance from the symphysis of the pubes.
h Vas deferens.
h† Spermatic cord.
h‡ Vesicula seminalis.
i Prostate gland.
† Cowper's gland.
k The bulb—the posterior end of the corpus spongiosum urethræ.
l Crus penis cut across.
m Superficial sphincter ani.
n Rectus muscle of the left side divided transversely.

THE ARTERIES.

1. Common iliac.
2. External iliac.
3. Internal iliac.
3†. Hypogastric.
4. Gluteal.
5. Sciatic.
6. Pudic. This artery is seen to give in succession the following branches, viz., two inferior hæmorrhoidal: the superficial perineal: the artery of "the bulb": that of the corpus cavernosum penis: and the dorsal branch of the penis. The pudic artery, it is to be remembered, does not, in the natural state of the parts, lie in contact with the rectum, the prostate or the urethra. It is at some distance from those organs, and other structures are interposed.—See above, the general remarks on the plate.
7. A branch distributed to the lower part of the bladder, to the vesicula seminalis, the prostate gland, and the rectum.
8. The end of the inferior mesenteric (superior hæmorrhoidal).

9. Sacral nerves.

INTERNAL ILIAC AND EXTERNAL ILIAC ARTERIES.

No.	Side of the Body.	INTERNAL ILIAC. Length in Inches.	INTERNAL ILIAC. Branches before the ultimate division.	EXTERNAL ILIAC. Length in Inches.	EXTERNAL ILIAC. Place of origin of the principal branches, &c.
15	R				Epigast. a little below Poup. lig. (from Femoral).
	L				Epigast. a little below Poup. lig. (from Femoral).
19a	R	$2\frac{1}{2}$			Epigast. $1\frac{3}{4}$ inch above Poup. lig., and gives Obturator.
	L	2			Epigast. gives Obturator.
32a	L				Epigast. $\frac{1}{2}$ inch above Poup. lig., and gives Obturator. Circumfl. Il. as two brs.
32b	L				Epigast. gives Obturator.
33	R				Epigast. from commencement of Femoral, and gives Obturator. Circumfl. Il. as two brs.; one of which arises from end of Ext. Iliac, the other from commencement of Femoral.
	L				Epigast. under Poup. lig., and gives Obturator.
33a	L				Epigast. at Poup. lig., and gives Obturator. Circumfl. Il. at Poup. lig., and gives Int. Circumfl.
34	R				Epigast. gives Obturator. Circumfl. Il. at Poup. lig., and gives a Br. which takes the place of one from Ext. Circumfl.
	L				Epigast. gives Obturator.
34e	R				Epigast. gives Obturator.
	L				Epigast. gives Obturator.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
36	R				Epigast. at Poup. lig. Circumfl. Il. from commencement of Femoral.
	L				Epigast at Poup. lig. Circumfl. Il. from commencement of Femoral, and gives a descending Br. to the thigh.
37	L				Epigast. gives Obturator.
37b	R				Epigast. gives Obturator.
38	R				Epigast. gives Obturator.
38b	L				Epigast. at Poup. lig.
39	R				Epigast. gives Obturator.
41	L				Epigast. gives Obturator.
48	L				Epigast. gives Obturator.
50	R				Epigast. at Poup. lig.
	L				Epigast. $\frac{1}{4}$ inch below Poup. lig. (from Femoral).
51	R	1			Gives Obturator at middle.
	L	1			
52	R	$2\frac{1}{4}$			
	L	2		4	
53	R	$1\frac{1}{2}$			
	L	$1\frac{1}{2}$			
54	R	$1\frac{1}{2}$			
	L	$1\frac{3}{4}$			
55	R	$1\frac{1}{2}$		4	Epigast. $\frac{1}{2}$ inch above Poup. lig.
	L	$1\frac{1}{2}$		4	Epigast. close to Poup. lig.
56	R	2		$4\frac{1}{2}$	Epigast. at Poup. lig.
	L	2		$4\frac{1}{2}$	Epigast. at Poup. lig., and gives Obturator.
57	R	$2\frac{3}{4}$		5	Epigast. $\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	3		5	Epigast. at Poup. lig., and gives Obturator.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
58	R	$1\frac{1}{4}$		4	Epigast. $\frac{1}{2}$ inch above Poup. lig.
	L	$1\frac{3}{4}$		$4\frac{1}{2}$	Epigast. $1\frac{3}{4}$ inch above Poup. lig.
59	R	1			
	L	$1\frac{1}{4}$			Epigast. gives one of two brs., which form the Obturator.
60	R	$1\frac{1}{4}$			
	L	$\frac{3}{4}$			
63	R	$1\frac{1}{2}$			Epigast. a little below Poup. lig. (from Femoral).
	L	$1\frac{1}{2}$			Epigast. gives Obturator.
64	R				Epigast. a little below Poup. lig. (from Femoral.
	L				Epigast. at Poup. lig.
65	R	$1\frac{1}{4}$		$3\frac{3}{4}$	Epigast. and Circumfl. Il. $\frac{1}{2}$ inch above Poup. lig.
	L	$1\frac{1}{4}$		3	Epigast. under Poup. lig.
66	R	2		$3\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.
	L	2		4	Epigast. and Circumfl. Il. at Poup. lig.
67	L	$\frac{3}{4}$	gives Ilio-lumbar at middle.	3	Epigast. and Circumfl. Il. under Poup. lig.
68	R	$\frac{1}{2}$			Circumfl. Il. as two brs.: one at Poup. lig., the other at 1 inch above it.
69	R	2			Epigast. and Circumfl. Il. close to Poup. lig.
	L	2			Epigast. and Circumfl. Il. close to Poup. lig.
70	R	$1\frac{1}{2}$		4	Epigast. at Poup. lig. Circumfl. Il. as two brs.: one at Poup. lig., the other at 1 inch above it.
	L	$1\frac{1}{2}$		4	Epigast. and Circumfl. Il. at Poup. lig.
71	R	$1\frac{3}{4}$			Epigast. and Circumfl. Il. a little below Poup. lig. (from Femoral).
72	R	$1\frac{3}{4}$		4	Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{3}{4}$		$3\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
73	R	$1\frac{1}{4}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{4}$			Epigast. at Poup. lig. Circumfl. Il. $\frac{1}{2}$ inch below it (from Femoral).
74	R	1			Epigast. and Circumfl. Il. at Poup. lig.
	L	1			Epigast. and Circumfl. Il. at Poup. lig.
75	R	1		$4\frac{1}{2}$	Epigast. and Circumfl. Il. 1 inch above Poup. lig.; former gives Obturator.
	L	1		4	Epigast. and Circumfl. Il. under Poup. lig.
76	R	$1\frac{1}{4}$		3	Epigast. $\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	1		$3\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig.
77	R	$2\frac{1}{4}$		4	Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$		$3\frac{1}{2}$	Epigast. and Circumfl. Il. close to Poup. lig.
78	R	1		$3\frac{1}{2}$	Epigast. $\frac{1}{2}$ inch above Poup. lig., and gives Obturator. Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$		$3\frac{1}{2}$	Epigast. $\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. at Poup. lig.
79	R	$1\frac{1}{4}$	gives Ilio-lumbar near origin.	$3\frac{1}{2}$	Epigast. under Poup. lig., and gives Obturator.
	L	$2\frac{1}{8}$		5	Epigast. and Circumfl. Il. at Poup. lig.
80	R	$1\frac{1}{2}$		$4\frac{1}{2}$	Is crossed 1 inch above Poup. lig. by Circumfl. iliac vein. Epigast. and Circumfl. Il. from commencement of Femoral.
	L	$1\frac{1}{2}$		$4\frac{1}{2}$	Is crossed by a large Circumfl. iliac vein as on R. side. Epigast. and Circumfl. Il. from commencement of Femoral.
81	R	$1\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.; former gives Obturator.
82	R	1			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{4}$			Epigast. and Circumfl. Il. 1 inch above Poup. lig.
83	R	1		$3\frac{3}{4}$	Epigast. under Poup. lig. Circumfl. Il. at Poup. lig.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L	1¼		3¾	Epigast. under Poup. lig. Circumfl. Il. at Poup. lig.
84	R	2		4	Epigast. under Poup. lig. Circumfl. Il. ¼ inch above it.
	L	2		4	Epigast. and Circumfl. Il. under Poup. lig.
85	R	1¼		3¾	Epigast. and Circumfl. Il. from commencement of Femoral.
	L	1		3¾	Epigast. and Circumfl. Il. from commencement of Femoral; former gives Obturator.
86	R	1½		4¼	Epigast. ¼ inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	1½		4	Epigast. ½ inch above Poup. lig. Circumfl. Il. close to Poup. lig.
87	L				Epigast. at Poup. lig. Circumfl. Il. ½ inch below Poup. lig.
88	R	1¼		4½	Epigast. 1 inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	1½		4	Epigast. ½ inch above Poup. lig. Circumfl. Il. at Poup. lig.
89	R	1¼		4	Epigast. ½ inch above Poup. lig., and gives Obturator. Circumfl. Il. ¾ inch above Poup. lig.
	L	1½		4	Epigast. and Circumfl. Il. under Poup. lig. Obturator arises 1½ inch above same.
90	R	1½			Epigast. ½ inch above Poup. lig. Circumfl. Il. close to same.
	L	1½			Epigast. a little above Poup. lig. Circumfl. Il. at Poup. lig.
91	R	¾		3½	Epigast. at Poup. lig. Circumfl. Il. from commencement of Femoral.
	L	1		3½	Epigast. at Poup. lig. Circumfl. Il. from commencement of Femoral.
92	R	1			
	L	1¼			
93	R	¾		3	Epigast. and Circumfl. Il. at Poup. lig.
	L	¾		3	

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
94	R	1½		4¼	Epigast. and Circumfl. Il. at Poup. lig.
	L	1½		4½	Epigast. and Circumfl. Il. at Poup. lig.
95	R	2		3¾	Epigast. and Circumfl. Il. under Poup. lig.
	L	1		3½	Epigast. gives Obturator. Circumfl. Il. as two brs.
96	R	1½		4	Epigast. and Circumfl. Il. ½ inch above Poup. lig.
	L	2		4	Epigast. and Circumfl. Il. ½ inch above Poup. lig.
97	R	1		3¾	Epigast. and Circumfl. Il. at Poup. lig.
	L	1		3¾	Epigast. and Circumfl. Il. at Poup. lig.
98	R	2¼		4¾	
	L	1¾		4½	
99	R	1½			
	L	1½			
100	R	2		4	Epigast. and Circumfl. Il. from commencement of Femoral.
	L	1½		3½	Epigast. and Circumfl. Il. at Poup. lig.
101	R	1	Ilio-lumbar ¼ inch from origin.	3¾	Epigast. at Poup. lig. Circumfl. Il. as two brs.—one at Poup. lig., the other, ½ inch above it.
	L	1	Ilio-lumbar at lower end.	4	Epigast. and Circumfl. Il. ½ inch above Poup. lig.
102	R	1¼		4	Epigast. and Circumfl. Il. at Poup. lig.
	L	1½	gives near beginning a Br. which perforates the vein.	4	
103	R	1¼			Epigast. 1½ inch above Poup. lig., and gives Obturator.
	L	1½			
104	R	1	Ilio-lumbar at mid.	3½	Epigast. and Circumfl. Il. at Poup. lig.
107	R	2		3½	Epigast. at Poup. lig. Circumfl. Il. from commencement of Femoral.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L	$1\frac{3}{4}$		4	Epigast. $1\frac{1}{4}$ inch above Poup. lig. Circumfl. Il. at Poup. lig.
108	R	1		$3\frac{1}{2}$	Epigast. a little above Poup. lig., and gives Obturator. Circumfl. Il. at Poup. lig., and divides immediately into two brs. of equal size.
	L	$1\frac{1}{2}$			Epigast. at Poup. lig. Circumfl. Il. $\frac{1}{2}$ inch below same.
109	R	3		$5\frac{1}{2}$	Epigast. from commencement of Femoral, and gives Obturator.
	L	$1\frac{1}{2}$		$4\frac{1}{2}$	Epigast. from commencement of Femoral, and gives Obturator.
110	L				Epigast. gives Obturator.
111	R	2		$4\frac{1}{4}$	Epigast. and Circumfl. Il. a little above Poup. lig.
	L	$1\frac{1}{2}$		$4\frac{1}{4}$	Epigast. and Circumfl. Il. under Poup. lig.; Epigast. gives Obturator.
112	R	2	Ilio-lumbar at mid.	$4\frac{1}{2}$	Epigast. 1 inch above Poup. lig., and gives Obturator. Circumfl. Il. 1 inch above Poup. lig.
	L	2	Ilio-lumbar at mid.	$4\frac{1}{2}$	Epigast. 1 iuch above Poup. lig., and gives Obturator. Circumfl. Il. 1 inch above Poup. lig.
113	R	1			
114	R	$1\frac{3}{4}$			Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
	L				Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
115	R	$1\frac{1}{2}$	gives at mid. a Br., which divides into Ilio-lumbar and Lateral sacral.	$4\frac{1}{4}$	Epigast. at Poup. lig. Circumfl. Il. from commencement of Femoral.
	L	$1\frac{1}{2}$		4	Epigast. and Circumfl. Il. at Poup. lig.
116	R	2	Ilio-lumbar close to lower end.		Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$	Ilio-lumbar close to lower end.		Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
117	R	$1\frac{1}{4}$	gives a Br. $\frac{1}{4}$ inch from lower end.	$3\frac{1}{4}$	Epigast. a little below Poup. lig., and gives Obturator. Circumfl. Il. at Poup. lig.

No.	Side of the Body.	INTERNAL ILIAC. Length in Inches.	Branches before the ultimate division.	EXTERNAL ILIAC. Length in Inches.	Place of origin of the principal branches, &c.
	L	1¼	gives a Br. at mid.	3½	Epigast. and Circumfl. Il. at Poup. lig.
118	L				Epigast. gives Obturator.
119	R	1¼	Ilio-lumbar above mid.	3½	Epigast. and Circumfl. Il. ¼ inch above Poup. lig.
	L	1¾	Ilio-lumbar close to origin.	3½	Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives one of two brs. which form Obturator.
120	R	1	Ilio-lumbar at origin, and Lateral sacral at mid.	2¾	Epigast. and Circumfl. Il. under Poup. lig.
	L	1	Ilio-lumbar at mid.; and two Lateral sacral brs.—one at beginning, the other at lower end.	3	Gives Epigast. and Circumfl. Il. under Poup. lig.
121	R	1¼		3¾	Epigast. at Poup. lig., and gives Obturator.
	L	1½	Ilio-lumbar at mid.	3¾	Epigast. at Poup. lig., and gives Obturator.
122	R	1¾		3½	Epigast. ½ inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	1¾			
123	R	1¼	Ilio-lumbar at mid.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	1¾	Ilio-lumbar and Lateral sacral near mid.		Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
124	R	1½	Ilio-lumbar at mid.		
125	L				Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
127	R	¾	Ilio-lumbar near lower end.	3½	Epigast. and Circumfl. Il. at Poup. lig.
	L	1¼	Ilio-lumbar near lower end.	3½	Epigast. and Circumfl. Il. at Poup. lig.
128	R	1½	Ilio-lumbar from lower end.		
	L	2	Ilio-lumbar at ¼ inch from lower end.		

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
129	R	1½		4	Epigast. from Femoral ½ inch below Poup. lig., and passes inwards and upwards behind the femoral vein. Circumfl. Il. at Poup. lig.
	L	2			Epigast. and Circumfl. Il. at Poup. lig. Epigast. passes at first behind the iliac vein.
130	R	1		3½	Epigast. and Circumfl. Il. at Poup. lig.
	L	1		3½	Epigast. and Circumfl. Il. at Poup. lig.
131	R	1			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	1¼			Epigast. and Circumfl. Il. at Poup. lig.
132	R				Epigast. at Poup. lig. Circumfl. Il. as three brs.; one of which arises at Poup. lig., another above it, the third below it.
	L				Epigast. at Poup. lig. Circumfl. Il. as three brs.; one of which arises at Poup. lig., another above it, the third below it.
133	R	1		3	Epigast. at Poup. lig. Circumfl. Il. under it.
	L	1		3	Epigast. a little above Poup. lig. Circumfl. Il. a little below same.
134	R	1	Ilio-lumbar near lower end.	2¾	Epigast. from Femoral a little below Poup. lig., and gives Obturator. Circumfl. Il. as two brs.; one at Poup. lig., the other one inch above it.
	L	1¼	Ilio-lumbar from lower end.	3	Epigast. under Poup. lig., and gives Obturator. Circumfl. Il. a little below Poup. lig.
136	R	1¼			Epigast. and Circumfl. Il. at Poup. lig. Former gives Obturator.
	L	1¼			Epigast. and Circumfl. Il. at Poup. lig.
137	R	1	Ilio-lumbar at mid.		
	L	1			
138	R	1¼			Epigast. and Circumfl. Il. at Poup. lig.
	L	2			Epigast. and Circumfl. Il. at Poup. lig.
139	L	¼			

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
140	R				Epigast. and Circumfl. Il. 1 inch above Poup. lig.
	L	1			Epigast. $1\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. as 2 brs., one of which arises at Poup. lig., the other $1\frac{1}{4}$ inch above it.
141	R	$1\frac{1}{4}$	Ilio-lumbar at mid.	$3\frac{3}{4}$	Epigast. $\frac{1}{4}$ inch above Poup. lig.
	L	$1\frac{1}{2}$	gives a Lumbar and Ilio-lumbar brs. near mid.	4	Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
142	R	$1\frac{1}{2}$	Ilio-lumbar $\frac{1}{2}$ inch from lower end.	$3\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$	Ilio-lumbar near upper end.	$2\frac{1}{2}$	Epigast. and Circumfl. Il. close to Poup. lig.
145	R	$1\frac{1}{2}$		4	Epigast. and Circumfl. Il. at Poup. lig.
	L	1	Ilio-lumbar at mid.	$3\frac{1}{2}$	Epigast. at Poup. lig., and gives one of two Obturator brs.
147	R				Epigast. and Circumfl. Il. at Poup. lig. Obturator from Ext. Iliac, at $1\frac{1}{2}$ inch above Poup. lig.
	L	$1\frac{1}{4}$			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
149	R	$1\frac{3}{4}$		$3\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{4}$			
150	R	1	Ilio-lumbar at mid.		Epigast. and Circumfl. Il. $\frac{1}{4}$ inch above Poup. lig. Epigast. gives Obturator.
	L	1		$3\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
151	R		Ilio-lumbar 1 inch from beginning.		
	L	$1\frac{1}{2}$	Ilio-lumbar $\frac{1}{2}$ inch from beginning.	$3\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.
152	R				Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	$\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
154	R	1			
155	R	1	Ilio-lumbar at mid.		
	L	1			
156	R	1 1/4		4 1/4	Epigast. and Circumfl. Il. at Poup. lig.
	L	1 1/2	Ilio-lumbar 1/4 inch from beginning.	3 1/2	Epigast. 1 1/2 inch above Poup. lig. Circumfl. Il. at Poup. lig.
157	R	1 1/4	gives Ilio-lumbar.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	1 1/2	Ilio-lumbar and a Lateral sacral 1 inch from origin.		Epigast. and Circumfl. Il. at Poup. lig.
158	R	1 1/8	Ilio-lumbar near lower end.		Epigast. gives a Br., which runs behind the pubes and is distributed to the clitoris.
	L	1 1/8	Ilio-lumbar near lower end.		
159	R	1 1/2	a Lumbar br. at beginning.		
	L	1			
161	L	2 1/2	Ilio-lumbar near lower end.	5 1/2	
162	R			3 3/4	Epigast. 3/4 inch above Poup. lig., and gives Obturator. Circumfl. Il. at Poup. lig.
	L				Epigast. 1 1/8 inch above Poup. lig., and gives Obturator. Circumfl. Il. under Poup. lig.
164	R	1 1/4	gives a Br. near lower end.		
	L	1 1/2	Ilio-lumbar near lower end.		
165	R	3/4			Circumfl. Il. as two brs.
	L	3/4	gives at beginning Ilio-lumbar, which perforates the com. iliac vein.		
165*	R	1 1/2			Epigast. and Circumfl. Il. at Poup. lig.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L	$1\frac{1}{8}$	Ilio-lumbar at lower end.		
166	R	1			
	L	I			
168	R	$1\frac{1}{4}$			
	L	$1\frac{3}{4}$	Ilio-lumbar at mid.		
169	R	$1\frac{1}{2}$			
	L	$1\frac{1}{2}$			
170	R	$2\frac{1}{4}$	Ilio-lumbar near mid.	4	Epigast. and Circumfl. Il. at Poup. lig.
	L	2	Ilio-lumbar at mid.	$3\frac{3}{4}$	Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
172	R	3		$5\frac{1}{4}$	Epigast. 1 inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	$2\frac{1}{4}$	(the main artery is very tortuous.)	$5\frac{1}{2}$	Epigast. $\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. at Poup. lig. The main artery is very tortuous.
173	R	$1\frac{1}{2}$	Ilio-lumbar is given at mid., and as two distinct brs.		Epigast. and Circumfl. Il. close to Poup. lig.
173*	R	$1\frac{3}{8}$		$4\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	$1\frac{1}{4}$	Ilio-lumbar near lower end.	4	Epigast. and Circumfl. Il. at Poup. lig.
174	L				Epigast. at Poup. lig., and gives Int. Circumfl.
176	R	1			Epigast. and Circumfl. Il. at Poup. lig.
	L	$\frac{5}{8}$			Epigast. and Circumfl. Il. at Poup. lig.
177	R	$2\frac{1}{8}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	2	Ilio-lumbar at lower end.		Epigast. and Circumfl. Il. at Poup. lig.
178	R	$1\frac{1}{8}$	Ilio-lumbar at mid.	$4\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{8}$	Ilio-lumbar at beginning.	$3\frac{1}{4}$	Epigast. and Circumfl. Il. $\frac{1}{2}$ inch above Poup. lig.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
179	R	$2\frac{1}{4}$	Ilio-lumbar at lower end.	5	Epigast. $\frac{1}{2}$ inch above Poup. lig. Circumfl. Il. close to Poup. lig.
	L	2	Ilio-lumbar at lower end.	$5\frac{1}{4}$	Epigast. I inch above Poup. lig. Circumfl. Il. at Poup. lig.
180	R	$1\frac{3}{4}$		$3\frac{1}{2}$	Epigast. and Circumfl. Il. a little above Poup. lig. Epigast. gives Obturator.
	L	$1\frac{1}{2}$		$3\frac{1}{2}$	Epigast. and Circumfl. Il. a little above Poup. lig. Epigast. gives Obturator.
181	R	$1\frac{1}{8}$			
	L	1			
185	R	1			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	$1\frac{1}{4}$			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
186	R	$1\frac{1}{2}$	Ilio-lumbar $\frac{1}{4}$ inch from lower end.	$3\frac{1}{2}$	Epigast. gives Obturator.
	L	$1\frac{1}{4}$		$3\frac{1}{4}$	Epigast. at Poup. lig.
187	R				Epigast. and Circumfl. Il. at Poup. lig.
	L				Epigast. at Poup. lig., and communicates with Obturator by several small brs. Circumfl. Il. as two brs.; one at Poup. lig., the other $\frac{1}{2}$ inch above it.
188	R	$1\frac{1}{4}$			Epigast. $\frac{1}{4}$ inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$	Ilio-lumbar and another small br. at mid.		Epigast. and Circumfl. Il. at Poup. lig.
189	R	$1\frac{1}{8}$			Epigast. and Circumfl. Il. close to Poup. lig.
	L	$1\frac{1}{2}$	Ilio-lumbar at mid.		Epigast. and Circumfl. Il. close to Poup. lig.
190	R	$\frac{1}{2}$	Ilio-lumbar at lower end.	$3\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig.
	L	I		$3\frac{1}{4}$	Epigast. and Circumfl. Il. at Poup. lig., and a small Muscular br. at mid.
191	R			$3\frac{1}{2}$	Epigast. and Circumfl. Il. close to Poup. lig. A small Br. of main artery winds round the external iliac vein, and passes under the psoas muscle.

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L			$3\frac{1}{2}$	Epigast. and Circumfl. Il. at Poup. lig.
192	R	$2\frac{1}{2}$	Ilio-lumbar at $1\frac{1}{2}$ inch from lower end.	$4\frac{1}{4}$	Epigast. a little above Poup. lig. Circumfl. Il. a little below it.
195	R	1	Ilio-lumbar at mid.		
	L	$1\frac{1}{4}$	Ilio-lumbar as 2 brs.; one at mid., the other at lower end.		
196	R	2	gives a Br. at its mid.		Epigast. and Circumfl. Il. a little above Poup. lig.
	L	$2\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.
199	R	$1\frac{1}{4}$			
	L	$1\frac{1}{4}$			
202	R				Epigast. and Circumfl. Il. at Poup. lig. Obturator $\frac{3}{4}$ inch above it.
	L				Epigast. and Circumfl. Il. a little above Poup. lig.
204*	R	$1\frac{3}{4}$			
	L	$1\frac{3}{4}$			
205	R	$1\frac{1}{2}$	Ilio-lumbar at mid.		Epigast. and Circumfl. Il. at Poup. lig.
	L		Ilio-lumbar at mid.		
207	R	$1\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{4}$	Ilio-lumbar near origin.		
208	R	1	Lateral sacral at mid., Ilio-lumbar at lower end.		Epigast. and Circumfl. Il. at Poup. lig.
	L	$\frac{7}{8}$	Lateral-sacral at mid.		
210	R	2	Ilio-lumbar at mid.		

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L	$1\frac{3}{4}$	gives a Br. at mid.		
212	R	$2\frac{3}{8}$	A Lumbar br. ($\frac{1}{2}$ inch from lower end); and Ilio-lumbar.		
	L	2	A Lumbar br. at mid., and Ilio-lumbar at end.		Epigast. at Poup. lig., and gives Obturator.
213	R	1	Ilio-lumbar at mid.		
	L	$\frac{7}{8}$			
215	R	$1\frac{3}{8}$	A Lumbar br. at 1 inch from beginning.		Epigast. close to Poup. lig. Circumfl. Il. as two brs., one of which arises at 1 inch above Poup. lig., the other a little higher up.
	L	$1\frac{1}{2}$			Epigast. from Profunda-femoris.
216	R	$1\frac{7}{8}$			Epigast. 1 inch above Poup. lig.; Circumfl. Il. at Poup. lig.; Obturator, as a distinct br., a little higher than Epigast.
	L	1	Ilio-lumbar near mid.		
217	R	1			
	L	$1\frac{1}{8}$	Ilio-lumbar at mid.		
219	R	$1\frac{3}{8}$			Epigast. and Circumfl. Il. close to Poup. lig.
	L	$1\frac{1}{4}$			Epigast. and Circumfl. Il. close to Poup. lig.
222	R	$1\frac{1}{4}$	A Lumbar br. at mid., and Ilio-lumbar at lower end.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
223	R	$1\frac{1}{2}$	Ilio-lumbar $\frac{1}{4}$ inch from lower end.		Epigast. 1 inch above Poup. lig. Circumfl. Il. $\frac{1}{4}$ inch above same.
224	R	$1\frac{3}{4}$	Ilio-lumbar $\frac{1}{4}$ inch from lower end.		
	L	$1\frac{7}{8}$	gives two moderate Brs. in its course.		

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
225	R	1 1/4	A Lumbar br. near beginning.		Epigast. arises at Poup. lig., and gives Obturator. Circumfl. Il. as two brs.
	L		Ilio-lumbar at mid.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
226	R	1 7/8	A Lumbar br. at mid.		Epigast. at Poup. lig., and gives Obturator.
	L	2	A Lumbar br. at mid.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
227	R				Epigast. and Circumfl. Il. under Poup. lig.
	L				Epigast. and Circumfl. Il. at Poup. lig.
230	R	2			Epigast. 1/2 inch above Poup. lig. Circumfl. Il. at Poup. lig.
	L	1 1/4			Epigast. and Circumfl. Il. 1/2 inch above Poup. lig.
233	R	1 3/4			
	L	1 3/8			
234	R	1 1/4	gives a small Muscular br. near lower end.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	1			Epigast. at Poup. lig., and gives Obturator. Circumfl. Il. a little above Poup. lig.
237	R	1			Epigast. and Circumfl. Il. 1/2 inch above Poup. lig.
	L	1 3/8			Epigast. 1 1/4 inch above Poup. lig. Circumfl. Il. 1/2 inch above Poup. lig.
241	R	2 1/8	gives two Visceral brs. before division.		
	L	2 1/4	gives two Visceral brs. and Ilio-lumbar before division.		Epigast. and Circumfl. Il. a little above Poup. lig.
243	R	1 1/4			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	1			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
246	L	1		2 3/4	

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches.	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
247	R	1			
	L	1			Epigast. and Circumfl. Il. a little above Poup. lig. Epigast. gives Obturator.
249	R	$1\frac{3}{8}$			
	L	$2\frac{1}{8}$			
250	R	$1\frac{1}{2}$	A Lumbar br. at mid.		
	L	$1\frac{1}{2}$			
252	R	2			Epigast. and Circumfl. Il. from a common trunk at 1 inch above Poup. lig.
	L	$1\frac{3}{4}$			Epigast. and Circumfl. Il. near Poup. lig. Epigast. gives Obturator.
253	R	$1\frac{1}{2}$			
	L	$1\frac{1}{4}$			
254	R	2			
	L	$2\frac{1}{2}$			
256	R	$\frac{3}{4}$	gives lumbar portion of Ilio-lumbar near beginning. and iliac part of same near end.		Epigast. near Poup. lig., and gives Obturator.
	L	$\frac{3}{4}$	Ilio-lumbar at mid.		
257	R	$\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$	gives iliac portion of Ilio-lumbar near beginning.		Epigast. and Circumfl. Il. at Poup. lig.
260	R	1			
262	R	$1\frac{1}{4}$		4	Epigast. and Circumfl. Il. close to Poup. lig.
	L	$1\frac{3}{8}$			
264	R	$\frac{1}{2}$			
	L	1			
267	R	$2\frac{1}{4}$		$4\frac{3}{4}$	

No.	Side of the Body.	INTERNAL ILIAC.		EXTERNAL ILIAC.	
		Length in Inches	Branches before the ultimate division.	Length in Inches.	Place of origin of the principal branches, &c.
	L	$1\frac{1}{4}$		$3\frac{7}{8}$	
268	R			$2\frac{3}{4}$	
	L			$2\frac{3}{4}$	
269	R	$\frac{7}{8}$	Ilio-lumbar near lower end.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
	L	$1\frac{1}{4}$	A Lateral-sacral br. at mid.		Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.
269*	R	$\frac{3}{4}$			
	L	$\frac{3}{4}$			
281	R	$1\frac{7}{8}$	Lateral-sacral and Ilio-lumbar near mid.		
284	R	1	Ilio-lumbar at mid.		
	L	$\frac{1}{2}$			
287	R	1	Ilio-lumbar at mid.		
	L	$1\frac{1}{2}$	Ilio-lumbar at mid.		
288	R	$1\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig.
	L	$1\frac{1}{2}$			Epigast. and Circumfl. Il. at Poup. lig. Epigast. gives Obturator.

Abstracts of the foregoing table will be found in the observations on the internal iliac and the external iliac arteries.

EXPLANATION OF PLATE LXI.

In this plate are shown the superficial vessels of the perineum, together with the superficial fascia and muscles. To expose those parts as they are here represented, the body having been fixed in the position which is customary for the operation of lithotomy, the integuments were turned aside from the perineum, from the fascia lata covering the adductor muscles of the thighs, and from the margins of the great gluteal muscles. The dissection was completed by removing a portion of the superficial fascia.

The perineal space is seen to be bounded on each side by bone (the branches of the ischium and pubes), and behind by the gluteus maximus. In its area are contained muscles, arteries, and nerves, which are indicated by letters, together with the lower extremity of the intestinal canal (anus), and two masses of loose fat, which are placed one on each side between the rectum and the ischium, filling up deep depressions aptly named the ischio-rectal fossæ.

a Superficial fascia. The posterior part of this membrane has been cut away, in order to expose the muscles with the small arterial and nervous branches. The remaining fascia is shown to be connected on each side to the bone and to be continued forward into the scrotum.

b Accelerator urinæ.—The letter is on the junction between the two muscles thus named.

c Erector penis.

d Transversus perinei.

e Sphincter ani. This muscle is exposed by the removal only of the skin :—of which a small portion has been allowed to remain.

f Gluteus maximus.

1. Superficial perineal artery.
2. Superficial perineal nerve.

EXPLANATION OF PLATE LXII.

Parts more deeply placed than those in the last plate are here shown. The additional dissection consisted in the removal of the superficial muscles, viz., the erector penis, the transverse perineal, and a part of the accelerator urinæ on

each side, together with a portion of the superficial perineal arteries and nerves, and the mass of fat on each side of the rectum.

The muscles having been removed, the crus penis, the "bulb" and "spongy substance" of the urethra, and the deep perineal fascia were displayed; and by cutting away a small piece of the last-named structure on the left side, the pudic artery, with the artery of the bulb and Cowper's gland, was brought into view. Further, the fat on each side of the rectum having been dissected out of the deep angular depression (the ischio-rectal fossa) in which it was lodged, the levator ani, and the inferior hæmorrhoidal arterial, and nervous branches lay exposed.

a Superficial fascia.—Its posterior part has been removed.
b Accelerator urinæ. A portion of both the muscles has been cut away.
c Crus penis.
d Bulb of the urethra.
e Deep perineal fascia :—v. triangular ligament of the urethra.
f Levator ani muscle.
g Sphincter ani.
h Coccyx.
k Gluteus maximus muscle.
† Cowper's gland.

ARTERIES.

1. Pudic.
2. Superficial perineal.
3. Inferior hæmorrhoidal.
4. Artery of "the bulb."

The nerves exposed are the superficial, perineal, and the hæmorrhoidal.

EXPLANATION OF PLATE LXIII.

a Uterus.
b Vagina.
b† Inner side of the vagina partially turned outwards.
c Fallopian tube.
d Ovary.
e Round ligament of the uterus.
f Rectum :—intestinum rectum.
g Urinary bladder.
h Prostate gland.
i Bulb of the urethra.
k Corpus cavernosum penis.
l Section of the body of the pubes.
m Sacrum.
m† Coccyx.
n Vesicula seminalis.
n† Vas deferens.
o Ureter.
p Ischium—its tuberosity.
p† Ischium—its spine, sawed off.
q Suspensory ligament of the penis.

ARTERIES.

1. Aorta.
2. Common iliac.
3. Internal iliac.
3¹. Gluteal.
3‡. Sciatic.
4. External iliac.
5. Ovarian—right and left.
6. Uterine.

7. Vaginal.
8. Left pudic.
8¹. Right pudic.
8†. An unusual artery (accessory pudic), giving origin to both the arteries of the corpus cavernosum penis.
8‡. Another form of accessory pudic artery, giving origin to the "cavernous" and the dorsal artery of the penis of one side.
9. Inferior hæmorrhoidal.
10. Superficial perineal.
11. Artery of "the bulb."
12. That of the corpus cavernosum.
13. Dorsal branch of the penis.
14. Vesical.
15. Prostatic and inferior vesical. This artery furnishes small branches (besides those implied by the name) to the rectum and the vesicula seminalis. The last-named body receives also several long and delicate offsets from a small branch which arises below that marked 15. These little arteries were not visible except on turning aside the vesicula seminalis. They do not, therefore, appear in the drawing.
16. Superior hæmorrhoidal.

The figures marked 1 and 2 show respectively the ordinary disposition of some of the arteries of the female and male genital organs, and the other figures contain illustrations of some of the peculiarities of the pudic artery in the male.

Figure 1. The ovarian and uterine arteries are represented in this figure. On the right side the anterior layer of the broad ligament of the uterus was raised in order to display the blood-vessels of the uterus and its "appendages," viz., the ovarium, the Fallopian tube, and the round ligament.

The uterine artery ascends tortuously from the internal iliac by the side of the uterus, and gives to it numerous branches. Turning outwards at its upper end, the vessel divides into two branches, one of which joins the ovarian artery; the other ramifies on the Fallopian tube.

The ovarian artery is directed inwards from the side of the pelvis on the upper margin of the ovarium, between the layers of the serous membrane by which that organ is closely invested, and after distributing to it numerous branches, joins an offset of the uterine artery.

Figure 2. The arteries which are furnished to the urinary bladder are so numerous, that this outline—taken from a body, which had been injected with considerable success—has been introduced because it affords a more ample display of the branches than is contained in the more finished drawing, plate 60.

The remarks made with respect to the mode in which the pudic artery is shown in that plate (*ante*, pp. 373-4) are also

applicable here. The distance between the artery and the organs situated to its inner side—viz., the rectum and urethra—is in some degree indicated by the shadow of the vessel on those organs.

Among the small arterial branches, those on the prostate require especial attention. They will come again under notice in a subsequent part of this work—namely, in the commentaries on the operations of surgery.

Figure 3. The pudic artery of the left side ends in "the bulb;" and the "cavernous" and dorsal branches of the penis are given from an unusual artery. This, which may be named an accessory pudic artery, passes close to the bladder and the upper part of the prostate gland, and emerges from the pelvis under the arch of the pubes.

Figure 4. In the case represented in this figure, there existed an arrangement of the vessels nearly the same as that shown in the preceding figure. The difference consisted in the position of the accessory artery with respect to the prostate. Instead of lying on the upper margin of the gland as in fig. 4, the vessel was placed along its middle.

Figure 5. The ordinary pudic arteries of both sides are defective, and the deficiency is compensated by an additional or accessory artery.

On the left side, the pudic artery ends in the bulb of the urethra. The branch for the corpus cavernosum is derived from the third or added vessel; and the dorsal branch of the penis is supplied by the pudic artery of the opposite side.

The pudic artery of the right side, after furnishing a branch to "the bulb," is directed forward to the dorsum penis; and here, having more than the accustomed size, it makes up for the want of a dorsal branch from the left pudic artery.

An accessory pudic artery takes its rise from the end of the internal iliac of the right side, in connexion with the obturator branch, and courses along the side and fore part of the bladder and the upper surface of the prostate. After escaping from the pelvis under the pubic arch, this artery divides into two equal parts, which sink into the penis, becoming the right and left arteries of the corpus cavernosum.

Some arteries (accessory pudic) which, like those shown in the last three figures, pursue an unusual course to the penis, will be found represented in the following plate as they appear when viewed from the perineum.

EXPLANATION OF PLATE LXIV.

a Bulb of the urethra.
b Crus penis—with or without its muscular cover (the erector penis).
c Deep perineal fascia :—v. Triangular ligament of the urethra.
d Part of the "Constrictor of the isthmus of the urethra"—exposed by removal of a layer of the deep perineal fascia.
e Sphincter ani.
f Gluteus maximus.

ARTERIES.

1. Pudic.
1‡. An accessory pudic.—It emerges from the pelvis beneath the arch of the pubes, and furnishes branches ordinarily supplied by the pudic artery.
2. Artery of "the bulb."
2†. A second branch given to the same structure, or to the corpus spongiosum urethræ.
2‡. Artery of "the bulb"—derived from the accessory pudic (1‡).
3. Artery of the corpus cavernosum penis.
3‡. A "cavernous" branch furnished by an accessory pudic (1‡).
4. Dorsal artery of the penis.

Peculiarities of the arteries of the perineum are contained in all the figures of this plate.—In the first two, the artery of "the bulb" is seen to deviate from its ordinary course.—Some forms of those unusual arteries, which, in other plates, are represented in connexion with the pelvic viscera, are shown in the third and fourth figures of that before us, as they appear when viewed from the perineum.

Figure 1. On both sides, the artery of the bulb, instead of being directed horizontally, or nearly so, inwards, leaves the pudic artery near the tuberosity of the ischium and ascends obliquely to its destination.

Figure 2. Here, too, the artery of the bulb arises on each side farther back than usual; but this case differs from the preceding in some respects. *a.* In one, the artery is directed towards the bulb with a uniform inclination inwards; in the other, its course is at first more transverse, and afterwards

approaches more to the vertical direction. *b.* There are two arteries on the right side, in the second figure. *c.* In that figure, also, the vessels enter the erectile tissue, in which they ramify, at a greater distance from its posterior end than occurs in the first figure—or than is usual.

Figure 3. The ordinary pudic arteries are defective on both sides, but in unequal degrees; and accessory arteries, which escape from the pelvis near the arch of the pubes, take their place—furnishing some branches usually given from the pudic.

On the left side, the pudic artery ends in "the bulb," and the two remaining branches, namely, the "cavernous" and "dorsalis penis," are supplied by an accessory pudic artery.

The pudic artery of the left side, after giving the superficial perineal branch, ends in small offsets to the structures situated about the middle of the perineum. A supplemental artery (accessory pudic) escapes from the pelvis lower than that on the opposite side, and furnishes to the penis its three branches *.

An anastomosis exists on each side, between the proper pudic and the accessory one.

Figure 4. The posterior part of the pelvis was more than commonly raised and brought into view while this sketch was taken.

An accessory pudic artery exists on the right side only. It is of very small size, and is distributed exclusively to the corpus cavernosum, which also receives a branch from the proper pudic.

The accessory pudic arteries represented in the last two figures of this plate were derived from the internal iliac or one of its divisions. An example of a similar vessel, given from a different source, will be found in the first figure of the next plate.

* In a drawing which Mr. Liston has lately shown me, the arteries of the right side have very nearly the same arrangement that here occurs on the left.

EXPLANATION OF PLATE LXV.

a Innominate bone—its iliac fossa.
a† Iliac fossa covered by the iliacus muscle.
b Sacrum :—os sacrum.
c Urinary bladder.
d Corpus cavernosum penis.
e Crus penis of the left side.
f Rectum :—intestinum rectum.
g Pubes—its symphysis, or a section of the body.
h Part of the lateral muscles of the abdomen.

ARTERIES.

1. Common iliac.
2. Internal iliac.
3. External iliac.
4. Circumflex iliac.
5. Epigastric.
6. Obturator.
6†. Obturator given from the epigastric.
7. Pudic.
8. Artery of "the bulb."
9. That of the "corpus cavernosum."
9†. A "cavernous" artery, derived from the obturator.
10. Dorsal branch of the penis.

VEINS.

11. Vesical, as they approach the internal iliac.
12. Hæmorrhoidal.
13. Veins encircling the prostate.

The first figure of this plate contains the representation of a supplemental or accessory pudic artery proceeding from a very uncommon source.—The next two are introduced to illustrate the disposition of the veins about the neck of the urinary bladder and the prostate. They are drawn on a reduced scale.—Some peculiarities of the branches of the external iliac artery are shown in the remaining figures.

Figure 1.* An accessory pudic branch (9 †) given from the obturator passes to the perineum beneath the pubic arch, and ends in the corpus cavernosum penis.

The pudic artery gives the accustomed branches—that to the corpus cavernosum, however, being small, is aided by the accessory artery.

A small branch crosses the pelvis in the ordinary course of

* The original drawing for this figure has been kindly furnished to me by Professor Allen Thomson, under whose observation the case occurred. The objects being represented of the natural size, it will be readily inferred that the body was that of a young person.

The pudic artery and the small obturator (6 and 7) are not shown in the original drawing; but, with a view to prevent the necessity of an additional sketch, an indication of them has been given in dotted lines. The course of these vessels has been supplied from a deeper view or plan, with which likewise I have been favoured by Dr. Thomson.

the obturator when derived from the internal iliac, and ends in the large obturator, which in this case is given from the epigastric.

Figure 2. Large veins are shown on the urinary bladder.

Figure 3. The prostate is surrounded by very large veins. The preparation sketched in this figure was taken from the body of a man in advanced age.

Figure 4. The epigastric artery arises above the middle of the external iliac.

In figure 5 the branches of the external iliac arise considerably above the position at which they generally take their origin. There are in this case other peculiarities deserving of notice: the circumflex iliac takes its origin in two separate parts; and the epigastric gives off the obturator, at a greater distance than usual from its origin—in other words, the common trunk of the epigastric and obturator has more than the accustomed length.

Figure 6. The obturator artery arises separately from the external iliac, a little above the epigastric and circumflex iliac.

Figure 7. The origin of the obturator is here, likewise, from the external iliac artery, but it is placed considerably higher than in figure 6.

EXPLANATION OF PLATE LXVI.

a The larger psoas muscle cut across.
b Iliacus.
c Transversalis abdominis.
d Rectus.
e External oblique.
f Internal oblique.
g Spermatic cord.
h Hernia.
k Femoral ring.

ARTERIES.

1. External iliac.
2. Epigastric.
3. Obturator.
3†. Obturator given from the epigastric.
4. Circumflex iliac.
5. A small portion of the pudic.

VEINS.

6. External iliac.
7. Saphenous.
8. Obturator nerve.

The first three figures of this plate have been introduced to illustrate various conditions of the obturator artery. Besides the blood-vessels, an innominate bone and some muscles are represented in each of the figures; but the obturator ligament and the bone in its neighbourhood were laid bare in the preparations delineated in the second and third; those parts were still covered by the internal obturator muscle and its fascia in the case of which the first is a representation.

The disposition of the obturator artery in the several figures is as follows:—Figure 1. That vessel having taken origin from the internal iliac, gives, before its exit from the pelvis, a considerable branch, which receives a small off-set from the epigastric. The communicating branch crosses the femoral ring.—The obturator artery of the second figure is derived from the epigastric, and is joined by a small branch from the internal iliac. In its course downwards, the artery passes close to the external iliac vein, and is situated to the outer side of the femoral ring.—Figure 3. Two branches of about equal size—one given from the internal iliac, the other from the epigastric—join behind the pubes, and from the point of union a single artery passes onwards from the pelvis. The part supplied by the epigastric arches inwards at a considerable distance from the external iliac vein, and curves over the anterior and inner side of the femoral ring.

Figure 4. The position of the epigastric artery, with reference to an oblique inguinal hernia, is shown in this figure. The external and internal oblique muscles are seen to have been divided, in order to expose the artery; the division of the transversalis fascia—which likewise is requisite for that purpose—will be found to be indicated in the first figure of the following plate.

EXPLANATION OF PLATE LXVII.

a External oblique muscle.
b Internal oblique.
c Transversalis.
c† The same muscle seen from behind, and covered by the fascia transversalis.
d Rectus.
d† The posterior surface of the same muscle.
e Pyramidalis.
f The larger psoas cut across. The tendon of the smaller psoas rests on it (figure 3).
g Iliacus.
h Hernia.
h† Opening of the hernial sac seen from behind.
k Spermatic cord.
l Testis.
m Sartorius muscle.

ARTERIES.

1. External iliac.
2. Femoral.
3. Epigastric.
4. Obturator.

VEINS.

5. External iliac.
6. Femoral.
7. Saphenous.

NERVES.

8. Obturator.
9. Anterior crural.

The chief object of this plate is to illustrate the position which the epigastric artery bears with respect to some forms of hernia.

Figure 1.—The artery, with its companion veins (which are partially exposed) lies to the outer side of a direct inguinal hernia; and some of the vessels of the spermatic cord—separated one from the other—are observable on the posterior part of its outer side.

The epigastric artery was brought into view by dividing the external and internal oblique muscles and the transversalis fascia. The conjoined tendons of the internal oblique and the transversalis muscles in this case arched above the hernia; which was fully distended when the drawing was under preparation.

Figure 2. The epigastric artery is moved inwards from its usual position by an oblique inguinal hernia, which was of long standing, and had increased largely at its upper part. In order that the vessels might be more fully displayed, the

hernia was little distended while the drawing was under preparation.

Figure 3 is another and different view of a case of the same kind as that delineated in the preceding figure. The innominate bone having been removed from the body, a portion of the anterior wall of the abdomen is here viewed from behind, and the epigastric artery is seen to curve round the upper opening or mouth of the sac of a large oblique inguinal hernia.

Figure 4. The epigastric artery and the vessels of the spermatic cord are shown in connexion with a femoral hernia. The course of the epigastric artery upwards to the rectus muscle, was displayed by turning a side apart of the external oblique muscle and removing portions of the internal oblique, and transversalis muscles, together with a little of the transversalis fascia. After the removal of the integuments and fasciæ of the thigh, for a small space, the origin of the same vessel was brought under view by drawing inwards the upper part of the hernia.

EXPLANATION OF PLATE LXVIII.

a External oblique muscle of the abdomen.
b Internal oblique.
c Transversalis.
c† The same muscle seen from behind and covered with the fascia transversalis.
d Rectus.
d† The posterior surface of the same muscle.
e Spermatic cord.
e† Vessels of the spermatic cord.
e‡ Testis.
f Poupart's ligament.
g End of the round ligament of the uterus.
h Hernia.
i Iliacus muscle.
k Larger psoas cut across.
l Obturator ligament.
m Sartorius muscle.

ARTERIES.

1. External iliac.
2. Femoral.
3. Epigastric.
4. Obturator.

VEINS.

5. External iliac.
6. Femoral.
7. Epigastric.
8. Saphenous.

NERVES.

9. Obturator.
10. Anterior crural.

In this plate examples are given of the different positions which the obturator artery, when derived from the epigastric, holds with reference to femoral hernia.

Figures 1 and 2. The obturator is placed to the outer side of the hernial sac.—In the front view of the parts contained, in the first figure, the vessels were exposed at their origin by the removal of a portion of the fascia lata, and of the sheath of the femoral vessels; and the epigastric artery, in its further progress upwards to the rectus muscle, was laid bare by turning outwards a part of the three lateral muscles of the abdomen with the fascia transversalis. The vessels are shown in connexion with the mouth of the hernial sac, in the posterior view given in the second figure. Both the drawings illustrate the close relation of the spermatic cord to the hernia.

Figures 3 and 4 are front and back views of the same preparation, which was taken from the body of an adult female*. The obturator artery curves over the anterior and the inner side of the sac of a femoral hernia.

* The preparation is in the collection of Mr. Liston; and I am indebted to him for the opportunity to place drawings of it in this work. It is necessary to state that the bone and muscles to the outer side of the large vessels, which had been removed from the preparation in order to diminish its bulk, have, in the drawing, been added or restored from a recent dissection.

OBTURATOR ARTERIES.

No.	Side of the Body.	Place of Origin and Course.
1	L	fr. Epigastric.
2†	R	fr. Epigast., and turns downwards at a moderate distance from the ext. iliac vein.
	L	fr. Epigast., and turns downwards close to the ext. iliac vein.
4b	R	fr. Epigast.
5*	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
5‡	R	fr. Int. Iliac.
10	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
10a	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards close to ext. Iliac vein.
13	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
13a	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
13b	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
15	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
15a	R	fr. Epigast., and turns downwards close to ext. iliac vein.
15b	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Int. Iliac.
16	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
19	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
19a	R	fr. Epigast.
	L	fr. Epigast.
27	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
28	L	fr. Epigast., and turns downwards close to ext. iliac vein.

No.	Side of the Body.	Place of Origin and Course.
29	R	fr. Epigast.
	L	fr. Int. Iliac.
30	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
31a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
31b	R	fr. Epigast., and turns downwards close to ext. iliac vein.
31‡	R	fr. Epigast., and turns downwards close to ext. iliac vein.
31†	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
31 f	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
32a	R	fr. Epigast., and turns downward close to ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
32b	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
33	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
33a	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
34	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
34a	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
37	L	fr. Epigast., and turns downwards close to ext. iliac vein.
37a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
37b	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Int. Iliac.
38	R	fr. Epigast., and turns downwards close to ext. iliac vein.
38b	R	fr. Int. Iliac.
	L	fr. Ext. Iliac above Epigast., and turns downwards close to ext. iliac vein.
39	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
40a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
40b	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
41	L	fr. Epigast., and turns downwards close to ext. iliac vein.
41a	R	fr. Int. Iliac.
43	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
45	R	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
	L	fr. Int. Iliac.
46	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
47*	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
48	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
48a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
49a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
50	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
51	R	fr. middle of External Iliac.
52	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
53	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
54	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
55	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
56	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance fr. ext. iliac vein.
57	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
58	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
59	L	is formed from two brs.: one of wh. is given from Int. Iliac, the other from Epigast.
60	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
61	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
63	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
64	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
65	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
66	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
67	L	fr. Int. Iliac.
69	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
70	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
71	R	fr. Epigast. a little below Poup. lig. In its course upwards and into the pelvis it lies close to the femoral and the iliac vein.
	L	fr. Int. Iliac.
72	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
73	R	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
	L	fr. Int. Iliac.
74	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
75	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
76	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
77	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
78	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Int. Iliac.
79	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
80	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
81	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
82	R	fr. Int. Iliac.
83	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
84	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
85	R	fr. Int. Iliac.
	L	is formed by union of two brs.; one of which is derived from Int. Iliac, the other fr. Epigast.
86	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
87	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
88	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
89	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Ext. Iliac at $1\frac{1}{2}$ inch above Poup. lig.
90	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
91	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
92	R	fr. Int. Iliac.
93	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
94	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
95	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
97	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
98	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
99	R	fr. Int. Iliac.
100	R	fr. Int. Iliac.
	L	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
101	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
102	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
103	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
104	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
106	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
107	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
108	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
109	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
110	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
111	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
112	R	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
113	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
114	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
115	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
115 a	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
116	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
117	R	from Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
118	L	fr. Epigast., and turns downwards close to ext. iliac vein.
119	R	fr. Int. Iliac.
	L	is formed by union of two brs.: one of which is given fr. Int. Iliac, the other fr. Epigast. Their union occurs at the obtur. foramen.
120	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
121	R	fr. Epigast., and turns downwards at a moderate distance fr. ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
122	R	fr. Int. Iliac.
	L	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
123	R	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
125	L	fr. Epigast., and turns downwards close to ext. iliac vein.
127	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
128	R	fr. Int. Iliac.
129	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
130	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
131	R	fr. Epigast., and turns downwards close to ext. iliac vein.
134	R	fr. Epigast., and turns downwards close to ext. iliac vein.
135	R	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
136	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
138	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
139	L	fr. Int. Iliac.
140	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
141	L	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
142	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
145	R	fr. Int. Iliac.
	L	is formed by two hrs. : one of which (the larger) is given by Int. Iliac, the other by Epigast. The latter turns downwards at a short distance from ext. iliac vein.
147	R	fr. Ext. Iliac 1½ inch above Poup. lig.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
149	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
150		fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
150	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
151	L	fr. Int. Iliac.
152	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Epigast., and turns downwards at a considerable distance fr. ext. iliac vein.
156	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
157	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Int. Iliac.
159	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.

No.	Side of the Body.	Place of Origin and Course.
162	R	fr. Epigast.
	L	fr. Epigast.
164	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
165	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
165*	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
169	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
170	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein, curving upon an enlarged lymphatic gland, which occupies the crural ring.
172	R	fr. Int. Iliac.
		fr. Int. Iliac.
173	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
173*	R	fr. Epigast., and turns downwards at a very short distance from ext. iliac vein.
	L	fr. Int. Iliac.
176	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
177	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
178	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
179	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
180	R	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
181	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
185	R	is formed by two brs.: the larger of which is derived fr. Epigast., and passes backwards close to the ext. iliac vein: the smaller is given fr. Int. Iliac. The union of the two occurs at the obturator foramen.
	L	fr. Epigast., and turns downwards close to the ext. iliac vein.
186	R	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
	L	fr. Int. Iliac.
187	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac; communicates with Epigast. by several small brs.
188	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
189	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
190	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
191	R	fr. Int. Iliac.
	L	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
192	R	fr. Int. Iliac.
195	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
196	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
202	R	fr. Ext. Iliac $\frac{3}{4}$ inch above Poup. lig.
204*	R	fr. Int. Iliac.
205	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
207	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
208	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
212	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
213	R	fr. Int. Iliac.
215	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
216	R	fr. Ext. Iliac $1\frac{1}{8}$ inch above Poup. lig.
217	R	fr. Int. Iliac.
220	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
222	R	is formed by two brs., which unite at the obturator foramen. The larger "root" arises from Epigast., and turns downwards close to ext. iliac vein: the smaller is derived fr. Int. Iliac.
	L	fr. Int. Iliac.

No.	Side of the Body.	Place of Origin and Course.
223	R	fr. Int. Iliac.
225	R	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
226	R	fr. Epigast., and turns downwards at a considerable distance from ext. iliac veiu.
	L	fr. Epigast., and turus downwards at a considerable distance from ext. iliac vein.
230	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
233	L	fr. Int. Iliac.
234	R	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
	L	fr. Epigast., and descends straight to obtur. foramen close to ext. iliac vein. It gives a considerable br. over the urinary bladder.
237	R	fr. Int. Iliac.
241	L	fr. Int. Iliac.
243	R	fr. Epigast., and turns downwards a short distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
247	R	fr. Int. Iliac.
	L	fr. Epigast., aud turns downwards close to ext. iliac vein.
249	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
250	R	fr. Int. Iliac., and gives the iliac Branch usually derived fr. Ilio-lumbar.

No.	Side of the Body.	Place of Origin and Course.
250	L	fr. Int. Iliac.
251	L	fr. Int. Iliac.
252	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.
253	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
254	L	fr. Epigast., and turns downwards close to ext. iliac vein.
256	R	fr. Epigast., and turns downwards close to ext. iliac vein.
257	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
262	R	fr. Epigast., and turns downwards close to ext. iliac vein.
	L	fr. Int. Iliac.
269	R	fr. Epigast., and turns downwards at a moderate distance from ext. iliac vein.
	L	fr. Epigast., and turns downwards at a short distance from ext. iliac vein.
269*	R	fr. Int. Iliac.
	L	fr. Int. Iliac.
281	R	fr. Int. Iliac.
284	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards at a considerable distance from ext. iliac vein.
287	R	fr. Int. Iliac.
288	R	fr. Int. Iliac.
	L	fr. Epigast., and turns downwards close to ext. iliac vein.

For an abstract of this table see the remarks on the obturator arteries.

THE ABDOMINAL AORTA.

The aorta, detached from the vertebral column, is represented in its whole length in plate 48; the abdominal part is shown in connexion with the trunk of the body, in plates 53 and 54.

The place of division.—I have not observed any striking peculiarities in the disposition of the abdominal portion of the great artery. Those mentioned in the table (page 348, et seq.), have reference to the height at which it divides into the two common iliac arteries. In each case the place of division was noted, referring it to the vertebræ (as is customary in treatises on anatomy), and to the highest part of the crest of the iliac bone. This latter point of reference was added because of the importance to the surgeon, in planning an operation, to have for his guidance objects which may be felt or seen on the surface of the body. The umbilicus could not be included as a point of reference, all the bodies having been examined when their dissection was far advanced. Its position, a little to the right of the bifurcation of the aorta, is shown in plate 55.

The following is an abstract of the cases noted in the Table:—

A.—Referring the division of the aorta to the vertebral column.

The number of bodies set down in the Table			196
The division occurred on the 3rd vertebra	above the middle	1	6
	on the middle	2	
	below the middle	3	
" between the 3rd and 4th vert.			12
" on the 4th vert.	above the middle	43	126
	on the middle, or nearly so	36	
	below the middle	47	
" between the 4th and 5th vert.			30
" on the 5th vert.	above the middle	21	22
	below the middle	1	
			196

B. Relation of the place of division to the crest of the iliac bone.

It was higher than the highest part of the bone.	by 2 inches	1	28
	more than 1, not exceeding $1\frac{1}{2}$	3	
	more than $\frac{1}{2}$, not exceeding 1	8	
	$\frac{1}{2}$ inch and less	16	

It was opposite the same point, or nearly 26

Below it . . . . . { ½ inch and less . . 47; more than ½, not exceed. 1 . 11; more than 1, not exceed. 1½ . 4; 2¼ inches . . . . 1 } 63

The entire number noted . . . . . —— 117

From the first of the foregoing abstracts, it appears that the aorta divided much more frequently on the fourth lumbar vertebra than on any other, and that in a very large majority of the cases—156 out of 196, or more than three-fourths—the division lay either on that vertebra or on the intervertebral disc below it; and this space may, therefore, be considered the ordinary place of division (see plates 53 and 54). The highest place of division noted is the upper margin of the third vertebra.* Examples of its occurrence on the third, the fourth, and the fifth vertebræ, are contained in the first three figures of the fifty-sixth plate. A case is described by Petsche,† from the collection of his "master," Cassebohm (Professor of Anatomy at Halle before the middle of the last century) which affords an example of higher bifurcation of the aorta than any other that I have found recorded. The division took place immediately after the origin of the right renal artery (the only renal artery that existed in the case); the inferior mesenteric artery arose from the left (common iliac) branch, and after its origin the two (common iliac) branches were connected by a transverse artery; each then divided into the external and internal iliac. Here, doubtless, the division was not situated below the second lumbar vertebra.

As regards the crest of the ilium:—the abstract shows the bifurcation of the aorta to have commonly ranged within half an inch above and below the highest point of this part of the bone. It was placed within that interval in 89 bodies among 117, or in the proportion of about 9 in 11; and the

* The case 19 b is erroneously marked in the Table as dividing on the second instead of the third vertebra.

† "In præparato quodam, in quo ren sinister deerat, arteria aorta inferior postquam arteriam renalem dextram dederat in duos ramos æquales dividebatur, a quorum sinistro oriebatur arteria mesenterica inferior, sub hac duo illi rami per alium transversalem inter se communicabant, deinde ramus sinister arteriam iliacam externam et internam sinistram formabat; ramus vero aortæ inferioris dexter arteriam iliacam externam et internam dextram constituebat."—Sylloge Observ. Anatom. Select., §. 77, in Haller. "Disputat. Anatom." t. vi. p. 781.

cases in which it occurred beyond the limits stated diminish rapidly in number as they depart from them.*

In general, the end of the aorta is placed on the vertebra a little to the left of its middle, or to the left of what is called the middle line of the body; but I have frequently observed it lying on the middle of the bone, without any deviation to either side, and in a few instances it was inclined to the right of that point (see plate 56).

BRANCHES OF THE ABDOMINAL AORTA.

Inasmuch as the peculiarities that take place in the branches derived from the aorta in the abdomen cannot be considered to have material influence with respect to the performance of surgical operations, I have not thought it necessary to make systematic or continuous observations on their arrangement. From time to time, however, the condition of a small number was marked in my note-book, and from these the following observations are drawn.

THE PHRENIC, OR INFERIOR DIAPHRAGMATIC ARTERIES.

The course of these arteries is represented in plates 53 and 54. It must be premised that the following statement of their disposition is deduced from the observation regularly written down of only a small number (thirty-six).

In their *place of origin*, the phrenic arteries were found to vary extensively, and they were given so frequently from a single or common trunk, that they may be placed in two

* It is perhaps necessary to observe, in connexion with the foregoing observations, that the upper margin of the crest of the iliac bone is far from ranging with the same part of the lumbar vertebræ in different bodies. This fact will be evident on examining the figures referred to in the text (plates 53, 54, 56). With the view of illustrating it still further, I have, while writing these remarks, carefully observed, with reference to the point in question, six bodies of adults in the dissecting-room (skeletons or dried preparations are, for obvious reasons, inadmissible for the purpose), and they gave the following results :—

1. Male.	The highest part of the crista ilii is opposite the upper margin of		4 h. vert.
2. Female.	"	opp. the space betw. upper margin and middle	4 h.
3. Male.	"	opposite middle	4 h.
4. Male.	"	opposite middle	4 h.
5. Female.	"	opposite lower margin	4 h.
6. Male.	"	opposite upper margin	5 h.

classes, founded on its presence or absence. The first and most numerous class will consist of those cases in which the arteries of the right and left side arise separately one from the other; in the second class will be comprised those in which a single small trunk gave origin to the two arteries.

A.—Where the two phrenic arteries arose separately, they were in some instances found to proceed from the same source, while in others, on the contrary, they emanated from different sources, as follows:—

1.—Both arising separately from the same parent vessel were found to spring
from the cœliac (plate 53, and 58, figure 4), in . . . 4 cases
from the aorta (plate 54, and 57, figure 3), in . . . . 1 "
from the coronary artery of the stomach . . . . 1 "
from the renal (plate 56, figure 5) . . . . . 1 "

2.—Both arteries having origin from different sources—they were thus disposed:
One was given from the aorta, the other from the cœliac in . 6 cases
from the aorta and the coronaria ventriculi (cœliac wanting in the case) . . . . . 1 "
from the cœliac and the coron. ventric. . . . . 2 "
from the cœliac and renal . . . . . 1 "
from the cœliac and superior mesenteric . . . . 1 "
from the cœliac (com. trunk of coron. ventric. and splenic), and the hepatic (this being given separately from the aorta) . . . . . 1 "

B.—When both arteries arose by a single or common trunk, this was observed to issue either from the aorta or from the cœliac artery, and the number for each was—

From the aorta 12
From the cœliac . . . . . 5 (plate 56, figure 6).

The common trunk of the former of these two sets of cases was found to be connected with the aorta below the margin of the diaphragm in seven instances; while in the rest (five) its commencement was covered by the diaphragm, and the division of a small portion of the muscle was necessary to display it fully. These conditions are illustrated in plate 57, figure 5, and plate 56, figure 4.

Summary.—The foregoing facts may be abridged as follows:—

The right and left phrenic arteries either arise separately

one from the other, or they take their origin from a small trunk common to both, from which they speedily separate to their respective destinations. Among thirty-six cases, the former arrangement prevailed in nineteen, and the latter in seventeen.

The phrenic arteries being given separately, and from different sources :—One was furnished with more frequency from the cœliac than from any other artery ; the other was derived occasionally from one of the neighbouring large branches, but most frequently from the aorta itself. And both arising separately and from the same parent vessel :—the place of origin was found to vary in different cases, but in a majority the cœliac artery was their source.

The arteries of both sides taking their rise together from a single or common trunk :—this was derived in two thirds of the cases from the aorta, and in the remainder from the cœliac.

A few peculiarities of less frequent occurrence, which have fallen under my observation, and are not referred to in the preceding remarks, may be briefly noticed.—The phrenic artery of the left side arose from the posterior aspect of the aorta in one case.—There was a considerable difference in size between the arteries of both sides, the right being considerably the larger. One example of this peculiarity was observed.—The right branch arose from the left side of the aorta and crossed above the cœliac to its proper position. It supplied branches to both the supra-renal capsules.—The artery of the right side arose singly under cover of the diaphragm and passed forward through the fibres of this muscle, a little above its lower margin. —Lastly, an example of a third phrenic artery occurred in the body marked 261 in the table. The additional branch was supplied by the left hepatic, and crossed the liver, with which it was in contact, in front of the Spigelian lobule. It is sketched in plate 56, figure 6.

CŒLIAC ARTERY. CŒLIAC AXIS.

This artery is shown in plates 53 and 54, in which it is seen to be very short and thick and to divide at the same point into three branches, viz., the coronary artery of the stomach, the hepatic and the splenic. The divergence or radiation of these arteries from nearly the same point, gives rise to the name "axis," applied to the common trunk. The cœliac frequently gives origin to one and occasionally to both the phrenic arteries.

The peculiarities of the cœliac artery which have come under my observation are the following :—

The origin was in a few instances found to be covered by a small part of the diaphragm.

The artery was longer than usual in several instances, measuring about an inch and a half, and then the large branches did not separate from it at the same time. The branch for the stomach arose first, and the cœliac ended by dividing into the hepatic and splenic nearly in the manner sketched in plate 56, figure 4.

In some cases the artery was smaller than usual, and furnished only two branches, viz., the splenic and coronaria ventriculi; the hepatic being given from another source—plate 56, figure 6. In a small number the analysis proceeded still further, and, the three branches arising separately from the aorta, the cœliac artery, did not exist. This peculiarity is represented in plate 57, figure 3.

The opposite change to that noticed in the last paragraph, namely an increase in the number of the branches furnished by the cœliac artery, is but rarely met with. The examples that have come under my notice may be referred to a premature division or splitting of one of the ordinary branches—both the resulting parts being implanted on the cœliac. Thus the gastro-duodenal artery, usually a branch of the hepatic, has been found to arise from the cœliac, close to the hepatic; and the coronaria ventriculi has occurred as two distinct branches, taking separate origin from the "axis." Under the same head may perhaps be mentioned the connexion at their origin between the cœliac and superior mesenteric arteries, of which I have seen a few examples.

CORONARY ARTERY. ARTERIA CORONARIA VENTRICULI.

This artery, usually a branch of the cœliac, has, in a few instances, been observed to arise directly from the aorta, (plate 57, figure 3,) and it has been given from the cœliac in two separate parts. It not unfrequently furnishes a large branch to the liver.

HEPATIC ARTERY.

The name applied to this artery imperfectly expresses its destination; for, after proceeding transversely to the right side for the space of a couple of inches, the trunk divides into two nearly equal parts, and one of these ascends towards the liver, being, therefore, the proper hepatic portion; while the other, named the gastro-duodenal, turns downwards, and is distributed to the stomach with the great omentum, the duodenum and a part of the pancreas. See plates 49 and 50. The two divisions of the main artery (hepatic and gastro-duodenal) I have in a few instances (three) observed to take their rise separately from the cœliac.

The most frequent change from the usual place of origin of the hepatic artery is its transference from the cœliac to the superior mesenteric (plate 56, fig. 6). It was found also to arise immediately from the aorta; and this occurred when the splenic and coronary branch of the stomach took their origin separately in the same way (plate 57, figure 3), and likewise, though more rarely, when these arteries were given from a common trunk.

An additional hepatic branch is often supplied by the coronaria ventriculi to the left lobe of the liver.

In one instance a supplemental or third phrenic artery was furnished from the left hepatic branch. It proceeded towards the middle of the diaphragm, in contact with the lower surface of the liver (plate 56, figure 6). And, likewise in a single case, one of the ordinary arteries of the diaphragm was given from the hepatic near its origin; the hepatic being at the same time derived directly from the aorta.

SPLENIC ARTERY.

The distribution of the splenic artery is displayed in plates 49 and 50. The observations made with reference to the sufficiency of the designation of the hepatic artery, apply equally to this, for a considerable part of it is distributed to the organs which the hepatic supplies, with the exception of the duodenum.

I have not remarked any peculiarities of the splenic artery which could be considered worthy of notice for the purposes of this work, excepting the change in the place of origin already referred to in the remarks on the cœliac artery, namely, the origin from the aorta, distinctly from other branches.

SUPERIOR MESENTERIC ARTERY.

This large artery and its branches are represented in plate 51, and a specimen of the arrangement of its smaller branches is given in plate 50, figure 2. The branches furnished to the small intestines and to the transverse colon, lie between two layers of the peritoneum in their course to the intestine; those which supply the ascending colon are on the other hand covered only on the anterior surface by the serous membrane. The superior mesenteric is occasionally connected at its origin with the cœliac artery. In many instances the hepatic artery will be observed to spring from it, (plate 56, figure 6). I found the gastro-duodenal in one case a branch of the superior mesenteric.

INFERIOR MESENTERIC ARTERY.

The origin of the inferior mesenteric artery, and the branches furnished to the colon, are shown in plate 52; the pelvic part (hæmorrhoidal) will be found in plates 59 and 60. Some of the branches of this artery lie between two laminæ of the peritoneum, namely those distributed to the sigmoid flexure of the colon, and the commencement of the rectum; the branches supplied to the descending colon are placed behind the

peritoneum, lying between that membrane and a layer of laminated cellular membrane,* (plate 52, e, e,) and the hæmorrhoidal branch has no connexion with the peritoneum as it approaches the lower end of the rectum, (plate 59^{11}, and plate 60^{8}.) The place of origin of the inferior mesenteric artery has some connexion with the surgical anatomy of the lower part of the aorta, and on this account its distance from the bifurcation was in some cases marked in my notes. I subjoin an abstract of them.

The space between the origin of the inferior mesenteric artery and the bifurcation of the aorta, was

less than 1 inch	in	5 cases
1 inch	in	10
more than 1 inch, not exceeding $1\frac{1}{2}$.	in	48
more than $1\frac{1}{2}$ inch, not exceeding 2 .	in	13
more than 2 inches, not exceeding $2\frac{1}{2}$	in	4
	—	80

The greater intervals placed at the lower part of this summary—those, namely, in which the space of two inches and upwards intervened between the origin of the inferior mesenteric and the end of the aorta—coincided, for the most part, with the low division of the aorta, referred to in the observations on the great artery.

RENAL ARTERIES.

The single artery which usually occurs on each side, divides into branches before entering the "hilus" of the kidney (plates 53, 54). Between this condition and the increase in the number of the renal arteries, a gradation, or what may be considered such, is recognisable in different cases. Thus:—the subdivision into branches increases, and it occurs at different points nearer to the origin of the artery. Of these changes various degrees are illustrated in plates 53, 54, and 56, figure 5.

* It may not be unnecessary to mention, that Professor Tiedemann in his plates of the ordinary disposition of the mesenteric arteries, unaccountably represents the right and left colic branches as having behind them as well as in front, an extensive layer of peritoneum—both layers apparently stretching from the aorta to the intestine. See his "Tabulæ Arteriarum," tab. 23, and 24, with the explanation of the plates.

Increase of number.—From the arrangement represented in the figure last referred to, where the renal artery divides close to its origin, we are conducted to the augmented number of arteries. They may be found to be two, three, four, or five—the highest numbers being the least frequent in their occurrence, (plate 57, figures 1, 2, 3, 4). I have not made observations to determine the proportionate frequency of the examples of the single and multiple condition of these arteries; and I can only say, with reference to this point, that the deviations from the ordinary state (singleness), are very common.

There is no correspondence in the number of branches met with on the two sides of the body. Indeed, the differences between their state on the right and left sides are so various, that every possible combination may be met with even in an inconsiderable number of bodies. In one case an increase of the number occurs on one side only—on the right side in it represented in plate 57, figure 3; on the left side, in the second figure of the same plate. Again, the increase may exist on both sides at the same time, the number being equal, as illustrated in plate 57, figure 1; and lastly, the augmentation existing on both sides, the number may be unequal.

The place of origin.—The renal arteries, even when considerably augmented in number are usually derived from the aorta, and as they are for the most part separated by intervals at their origin, the lowest is often implanted near the bifurcation of the great artery. In some rare cases, a renal branch has been found to proceed from the common iliac artery, as shown in plate 57, figures 3 and 4; and even from the internal iliac. Of the last peculiarity I have not hitherto met with an example; one is figured in the posthumous work of Eustachius.*

The arteries take their rise from the lateral aspect of the aorta; and deviations from this position are very rarely met with. In one case mentioned by Portal,† the right and left renal branches were derived from a common trunk, springing

* "Tabulæ anatomicæ * * quas e tenebris tandem vindicatas * * præfatione ac notis illustravit, I. M. Lancisius." (Tabula tertia).

† "Cours d'Anatomie Médicale," &c., t. 3, p. 290. Paris, An 12—1803.

from the fore part of the aorta, at a very short distance from the superior mesenteric. In another which came under my own observation, one of several renal arteries was connected with the fore part of the aorta at its bifurcation, or with the fore part of the left common iliac artery at its origin. See plate 57, figure 3.

Their entrance to the kidneys.—The branches of the renal artery usually enter the depression on the inner side of the kidney. When, however, the number of arteries is increased, a branch will not unfrequently be observed to enter through the convex part near the upper or lower end of the organ. A still further change from the ordinary condition is occasionally met with. This consists in the enlargement of the "hilus," or depression which spreads to the anterior surface of the kidney, and receives the vessels at different points, as represented in plate 57, figures 2, 3, 4. In one instance, I found an artery pass behind the kidney, and turn round the outer margin to arrive at the anterior surface, where it penetrated an extended depression of the kind mentioned, (figure 3). It will be observed, that the ureter is likewise connected to the fore part of the kidney in these cases.

Absence of one artery.—A few examples of the absence of one of the renal arteries have been recorded. I have met with only a single instance.

SPERMATIC ARTERIES.

The origin of the spermatic arteries, and their course as far as the entrance to the inguinal canal, are seen in plate 53; and one of them is represented in connexion with the spermatic veins in plate 55. The distribution of the analogous artery (ovarian) in the female will be found in plates 59 and 63.

Instead of a single branch on both sides, two are not unfrequently met with on one side. Both are in general given from the aorta, but occasionally one is derived from the renal artery. An example of three spermatic branches is represented in plate 57, figure 5—two arising from the aorta, the third from the renal.

AN UNUSUAL PULMONARY BRANCH.

Besides the branches to the viscera and the muscles of the abdomen, the abdominal aorta was in one instance found to furnish an artery to the lungs. As it was of large size, and could not be regarded as a nutritious vessel, this artery must be considered to be in more than one respect remarkable. It was thicker than the cœliac artery, was in contact with that vessel at its origin, and gave off the right phrenic branch. After entering the thorax by the œsophageal opening of the diaphragm, this singular artery divided equally between both lungs, supplying their lower parts or bases, and anastomosing by small branches with those of the proper pulmonary artery, which had the ordinary disposition.* This malformation was found in the body of a child aged seven years. No information could be got concerning the state of health during life ; but it is mentioned that the general conformation of the body was good—affording no indication of continued ill health.

VENA CAVA INFERIOR.

Preparatory to mentioning some of the peculiarities of this vein, it will be enough for the purpose of comparison to say of its usual disposition, that commencing on one of the lowest lumbar vertebræ, where it results from the junction of the two common iliac veins, it lies to the right side of the aorta (plate 55) ; receives the lumbar, the right spermatic, the renal and hepatic veins; perforates the tendinous centre of the diaphragm, and ends in the right auricle of the heart. It is considerably longer than the abdominal part of the aorta. The greater length is owing to the shape of the diaphragm, and the situation of the openings through it for the vessels. The artery passes from the thorax to the abdomen, through, or rather behind, the lowest part of the muscular partition interposed between these cavities, while the vein perforates it

* " Description d'une artère pulmonaire considérable, naissant de l'aorte abdominale, publiée par A. Maugars d'Angers, étudiant en médecine," in the " Journal de Médecine, Chirurgie, Pharmacie, &c., par les Cens. Corvisart, Leroux et Boyer."—Paris, An 10.

at the highest or most convex part (see plate 53, and especially plate 54). At the lower end, also, the vein extends a little farther than the other vessel.

Peculiarities of the vena cava inferior.—The deviations from the usual conformation, which are various in their forms, though unfrequently met with, may be arranged into two series, according to the manner of the termination of the great vein. In one series will be placed those cases in which the vein ends in the heart in the ordinary way, and in the other will be ranged those in which it terminates in the vena cava superior.

A.—The vena cava inferior having the usual mode of termination, is found to vary in its origin and course as follows:—

1. The two common iliac veins do not join, and the vena cava is not fully formed in the usual position. Instead of crossing, as ordinarily happens, to the right side to unite with the vein of the opposite side, the left common iliac vein, after sending a communicating branch across, where in the ordinary course it ends altogether, ascends on the left side of the aorta, and joins the left renal vein. The aorta, therefore, below the point at which it is crossed by the conjoined left iliac and renal veins, lies between two large venous trunks; and in strictness it might be said, that the vena cava exists only at the upper part of the abdomen, while the common iliac veins have much more than their accustomed length. Examples of this disposition of the veins cannot be said to be uncommon. One of several which I have met with has been sketched in figure 4, plate 58.

2. The two iliac veins are occasionally joined on the left side of the aorta, and the vena cava continues for some space on the same side; but after receiving the renal vein, it crosses over the great artery, and takes its ordinary place below the liver. This peculiarity is, according to my observation, much less frequent than that before described. A representation of it is given in plate 58, figure 2.

3. The vena cava is formed, as in the preceding case, on the left side, and continuing in its whole course on the same side, it reaches the heart without any change in direction; that organ, with others, having undergone the same change

of position with the vessels. This alteration in the position of the vein is only met with under the circumstances indicated, namely, when the viscera of the thorax and abdomen are transposed. The figure 3 in plate 58 has been drawn from a case of this kind.

B.—Of the second class of the peculiarities of the vena cava inferior the most simple is—

1. That in which, the common iliac veins joining in the ordinary way, the great trunk resulting from their union enters the thorax without receiving the hepatic veins, and after being joined by the intercostal veins, turns forward above the root of the right lung to terminate in the vena cava superior. It is obvious that the large venous trunk of this case (except in so far as the hepatic veins are concerned,) represents the vena cava inferior and the vena azygos. See plate 5, figure 5. Examples of this conformation of the veins have been recorded by Abernethy* and Dr. Horner.†

For the modifications of the large prævertebral vein, which characterises this class of cases, we are prepared by some of the peculiarities noticed in the preceding class, to which they will be found to present a close analogy, thus:—

2. The common iliac veins are united on the left side of the aorta, and the large vessel formed by their union (vena cava), having entered the thorax on that side, turns behind the aorta and the thoracic duct, to the less anormal position on the right side, and terminates as in the preceding case. It is obvious that here the vena cava follows the course successively of the vena azygos minor and vena azygos major; and the latter, it will be observed, on inspection of the figure, had its ordinary size below the place where it is joined by the great vein. The description given of this arrangement of the veins is taken from the case represented in the plate 58, figure 8.‡ In the same figure it will further be seen that the common iliac veins are not blended into a

* Philos. Transactions, 1793.

† Journal of the Academy of Natural Sciences of Philadelphia, vol. i.

‡ The case is described and figured by Gurlt, in an Essay to which reference has already been made (ante, page 371), and likewise by Otto, in his "Neue seltene Brobachtungen.—Zweite Sammlung," S. 68.

single trunk till they have reached upwards beyond the renal veins. In this respect their disposition accords with that of some cases included in the preceding class, but in the example before us, the trunk formed by the united renal and iliac veins of one side, crosses behind the aorta, not in front of it, as in the former. Compare the figures 4 and 8 of the plate last referred to.

A preparation, showing nearly the same arrangement of the large veins, but having the usual disposition of the iliac veins, is said by Otto to be in the possession of Professor Jeffray, of Glasgow.*

3. The large prevertebral vein has been found altogether on the left side, the vena cava superior having undergone a similar change of position. In this case the aorta and vena cava change places, and the change accompanies the general transposition of the viscera. This condition of the vessels is in part represented in plate 5, figure 4.

When the viscera are transposed, the relative position of the large blood-vessels, as might be expected, is likewise altered in the manner indicated in the last paragraph; but there has been placed on record a case which is exceptional in so far as the position of the vena cava inferior is concerned. In this instance, the viscera being transposed, the large iliac veins united on the right side of the aorta; the common trunk (vena cava) continued into the vena azygos on the same side, and inclined towards the left side to join the vena cava superior, only at the upper part of the dorsal region (plate 58, figure 7).†

The position the vein has with respect to the diaphragm requires some notice. Inasmuch as the large vein, which belongs to

* Einen gauz ähnlichlen Fall, der, so viel ich weiss, noch nicht beschrieben ist sah ich vor mehreren Jahren in der kleinen anatomischen Privatsammlung des Professor Jaffry (Jeffray?) in Glasgow, nur mit dem Unterschiede, dass die vena cava, an ihrem unteren Ende nicht so früh, wie in dem von mir beobachteten Falle, gespalten war, und dass noch eine eigene grosse vena hemiazygos vorhanden war, die sich in die linke vena jugularis thoracica nahe vor deren Theilung einmündete.—Ibid. S. 69.

† "Beskrivelsc over et menneskeligt Misfoster, &c. af. J. D. Herholdt," p. 11. Kjöbenhvan, 1828. When referring to the figure of the veins, in the description of the plates (ante, page 370), I was acquainted with this case only through the notice of it in the work of a German author. Since then, my attention has been kindly directed to a copy of the original essay in the library of the College of Surgeons, by Mr. Lawrence, who placed it in that library.

and characterises the second of the two classes of peculiarities here recognised, is at a certain point a large vena azygos, it would be expected to pass from the abdomen to the thorax in the place this (azygos) vein occupies under ordinary circumstances. Such is reported to have been its position in Otto and Gurlt's case, and such also was its position in Mr. M'Whinnie's, as I have been informed by that gentleman. But Mr. Abernethy states of his case, that "The inferior vena cava past, as usual, through a tendinous ring in the right side of the centre of the diaphragm; it afterwards pursued the course of the vena azygos, the place of which it supplied."

The peculiarities of the veins referred to the manner of their growth.—The varied conformation of the veins mentioned in the preceding pages is to a great extent explicable by reference to the early conditions of the venous system, and the succession of changes which takes place during its development. It is clearly ascertained that in mammiferous animals there are at an early state of growth two principal veins placed longitudinally one at each side of the vertebral column; and they receive the veins from the rudimentary lower limbs. But the blood from the limbs is subsequently diverted into the vena cava inferior, through anastomosing branches (iliac), and the symmetrical, longitudinal, or "cardinal" veins diminishing in proportional size and importance, are eventually represented by the "azygos" veins.

The formation of the vena cava inferior is complex, and, so far as the facts have been ascertained, appears to take place as follows. A vein is developed opposite the lumbar part of the vertebral column, and between the Wolffian bodies, from which, and from the genital and urinary organs, it receives branches. To the lower part of the venous trunk, now referred to, the blood of the crural veins is, at a certain period, directed through anastomosing branches, which become the iliac veins, and its upper part joins at the liver with the omphalo-mesenteric vein, in which the hepatic veins terminate. When the development follows the course here indicated, it leads to the ordinary disposition of the vena cava and the manner of growth being different, — if its stages should

be interrupted at any point of their progress, a deviation from that state will be the result. Thus:—supposing the lower or genito-urinary part of the vena cava to have received through the iliac veins the blood of the lower limbs, while, instead of being completed above by connexion with the other visceral veins at the liver, it pours its contents into a "cardinal vein" by one of the anastomosing branches which connect them, we should have the arrangement pointed out at page 428, § 1, and sufficiently illustrated in plate 58, figure 7; or if it continues partly into one and in part into the other of the same veins, the twisted course described at § 2 in the same page, and figured at plate 58, figure 8, will be the result. And these peculiarities will therefore be regarded as the consequence of an "arrest of the development," or an interruption to the ordinary course of the development, of the vena cava inferior.*

HEPATIC VEINS.

When the vena cava inferior has the conformation usually met with, it receives the large veins by which the blood is conveyed from the substance of the liver. A remarkable case, which is in part exceptional, has been put on record. In the body of a man who had attained the age of fifty-one, and had been generally healthy during the greater part of his life, Rothe, a German military surgeon, found one of the large hepatic trunks, terminating not in the vena cava or even in the auricle of the heart, but in the right ventricle, and its opening in that cavity was guarded by valves.† There were in this instance, therefore, two veins in the situation of the

* For a detailed account of the development of the venous system, reference may be made to Rathke, (Meckel's "Archiv." for 1830), and especially to the Essay of Stark ("Commentatio de Venæ azygos vi atque munere") in which the peculiarities met with in the vein forming the subject of the Essay, are associated with the manner of its growth. A concise statement of the facts ascertained concerning the development of veins will be found in Müller's "Elements of Physiology," transl. by Dr. Baly, p. 1625, and in Burdach's "Physiologie," t. 3, p. 522 of the French translation.

† "Historia duplicis venæ cavæ inferioris, seu ascendentis, et insolitæ dilatatæ auriculæ cordis dextræ." In the "Acta Academiæ Cæs. Reg. Josephinæ Medico-Chirurg. Vindobensis," T. 1, p. 233 and tab. 5. Vindobonæ 1788.—It should be stated, that the person in whose body this very unusual conformation of the vessels was found, appears to have died in consequence of disease of the two organs more immediately concerned with the peculiar disposition of the veins, namely, the Heart and the Liver. The time at which the diseased condition began to manifest itself is not mentioned; but it is to be inferred that it was not till towards the close of life.

inferior vena cava; but I cannot, with the author of the paper in which it is described, regard it as an example of double vena cava.*

In those cases in which the vena cava inferior ends in the superior cava, the hepatic veins open into the right auricle in the usual position of the great vein. And they generally unite into a single trunk before their termination; but in the preparation described by Dr. Horner there appear to have been two separate openings into the auricle. In his account of the case, these words occur: "The hepatic veins empty into the inferior part of the right auricle at the usual place of the inferior cava. The right hepatic vein passes in singly, the middle and left form a trunk."†

VENA CAVA SUPERIOR.

As no more suitable occasion can occur in the sequel of this work, a deviation from the usual arrangement of the principal veins of the upper part of the body may be noticed here, though not strictly the proper place. The innominate veins, which usually join to form a single trunk (vena cava superior), have, in several instances, been found to open separately into the right auricle. In these cases, the vein of the right side holds the ordinary course of the vena cava; but that of the left side, after sending a transverse branch to the former, extends downwards to the heart, and, turning round the left side of this organ, opens into the posterior part of the right auricle, in connexion with the coronary vein. This peculiarity is illustrated in plate 58, figures 6 and 10.

It is interesting to observe, that the conformation of the veins here described is the persistence of one which always exists at an early period of development in the human body; and that an analogous disposition is permanent in birds, and some of the mammalia, as the rabbit and elephant.

* I am not acquainted with any instance of what could strictly be considered a double vena cava inferior in the human subject. A well marked example found in a dog, has been figured by Kerkringius ("Observat." 29, pl. 11). The vena cava above the liver, is shown divided or split into two equal parts, which reunite immediately below the auricle of the heart.—Instances of similar division in several other large veins, occurring in the human body, are mentioned in this work.

† Loc. citat. p. 402.

A pulmonary vein, joining the vena cava superior.—A large pulmonary artery, derived from the aorta, having been mentioned in a former paragraph (page 426), we may here notice an example of a conformation to a considerable extent similar occurring in the venous system. The right pulmonary veins terminated altogether in the superior cava. The subject of this singular departure from the usual course of things was an adult; and it is stated that the malformation appeared not to have been attended with any disturbance of the healthy functions.*

THE COMMON ILIAC ARTERIES.

These arteries are shown in their natural position, but without the veins, in plates 53 and 54; with their accompanying veins they will be seen in plate 55.

The position of their origin.—For the place at or opposite which the iliac arteries take their rise, it will be sufficient to refer to the place of division of the aorta, with which it obviously must coincide; ante, page 415.

The place of division, in different cases, is very various. The following summary will show, in a condensed form, its position in those contained in the Table.

The artery divided on the 4th (in this case the last) lumbar vertebra in		R. 1 L. 1	— 2
,, ,, opposite the intervertebral disc between the 4th and 5th lumbar vertebra		R. 5 L. 3	— 8
On or opposite the 5th vertebra,	above the middle	R. 4 L. 4	— 8
	the middle, or nearly so	R. 15 L. 8	—23
	below the middle	R. 18 L. 13	—31
Opposite the intervert. substance, between the 5th vertebra and the sacrum		R. 12 L. 6	—18
Opposite the upper margin of the body of the sacrum		R. 11 L. 16	—27

* The case is delineated by I. F. Meckel in Fascic. 2, tab. 9, fig. 2, of his "Tabulæ Anat. Pathol." It was met with, as he states, by his grandfather.

Below the margin of the sacrum, and down to the sacro-iliac articulation, this included	R. 6 L. 14	—20
Below the sacro-iliac articulation, and in the iliac fossa	R. 3 L. 4	— 7

It will be observed that the majority of these arteries divided between the middle of the fifth lumbar vertebra and the upper margin of the sacrum—both these points inclusive; the number contained in this interval was 99, while above it there were 18 cases, and below it 27.

The artery of the left side most frequently descends to a lower level than the opposite. In the abstract, the arteries of the right side are most numerous at the upper part, while those of the left side preponderate towards the lower end. The latter, therefore, divide, for the most part, at a lower level than the former.

The length is an important consideration in the anatomy of a common iliac artery, because if a ligature should be applied, with a view to the cure of aneurism, the space intervening between the ligature and either end of the vessel would materially influence the result of the operation. The following is an abstract of the statements in the Table, with reference to this point.

Length in Inches.	Number on the right side.	Number on the left side.	Number on both sides.
$\frac{3}{4}$ *	1	1	2
1	3	4	7
more than 1, not exceeding $1\frac{1}{2}$ †	20	17	37
more than $1\frac{1}{2}$, not exceeding 2 ‡	43	43	86
more than 2, not exceeding $2\frac{1}{2}$ §	43	48	91
more than $2\frac{1}{2}$, not exceeding 3 ‖	41	35	76
more than 3, not exceeding $3\frac{1}{2}$ ¶	16	18	34
more than $3\frac{1}{2}$, not exceeding 4	6	5	11
$4\frac{1}{4}$	—	1	1
$4\frac{1}{2}$ **	1	—	1
	174	172	346

* Illustrated in plate 57, figure 9, right side.

† Plate 56, figure 3, left side.—Plate 57, figure 1, right side; figure 7, both sides; and figure 8, right side.

‡ Plate 53, right side.—Plate 56, figure 3, right side.—Plate 57, figure 1, left side; figure 3, left side; and figure 9, left side.

§ Plate 53, left side.—Plate 54, both sides.—Plate 55, both sides.—Plate 56, figure 2, both sides.—Plate 57, figure 6, right side.

‖ Plate 56, figure 1, left side.—Plate 57, figure 6, left side.

¶ Plate 56, figure 1, right side.

** Plate 58, figure 1.

Thus it is shown:—

That the common iliac artery varies much in length.

That in a large majority of our cases—about five-sevenths, the number being 127 in 174 on the right side, and 126 in 172 on the left side—the length varied between an inch and a half and three inches; and the cases were pretty evenly disposed over the different parts of that space.

That one instance in eight measured within half an inch less than the length of the majority, varying between an inch and an inch and a half. And that about an equal proportion ranged within an inch above the average, measuring, therefore, from three to four inches.

The minimum of length recorded in the Table is three-fourths of an inch, the maximum four inches and a half (plate 58, figure 1); and but a single example of each is mentioned. In one instance, I found the artery of one side no more than half an inch in length: this case is delineated in the eighth figure of the fifty-seventh plate.

Relative length of the right and left common iliac arteries.—Those anatomical writers who recognise a difference in this respect (e. g. Sœmmerring—after, as he states, Mayer and Walter—Portal, Meckel, Harrison, and others.) represent the artery of the right side to be the longer. In our Table (page 348, et seq.), the length of the arteries of both sides is mentioned for 168 bodies; and, on comparing, in each of these, the measurement of the artery of one side with the other, they stand as follows with respect to their relative length.

The arteries of both sides were equal in length in (This condition is illustrated in plate 56, fig. 2, and 57, fig. 7.)	53
That of the right side exceeded the left in (Plate 56, fig. 1, and 57, fig. 8.)	63
The left exceeded the right in (Plates 53 and 57, fig. 1, 3, 6, 9.)	52

In nearly a third, therefore, of these cases, both arteries were of equal length, and the difference existing in the remainder was somewhat more frequently in favour of the right than the left side.

Where the arteries measured unequally, the difference between them was in general small; but instances from time to

time occurred, which departed widely from this general statement, as exemplified in the eighth and ninth figures of the fifty-seventh plate.

Absence of a common iliac artery.—From the very early division of this artery, mentioned in a former paragraph, to its entire absence, the transition appears not to be difficult. Still no example of this condition has fallen under my notice, and the only one that I find to be recorded is mentioned by M. Cruveilhier. "In a preparation," says this anatomist, "contained in the Museum of the School of Medicine (of Paris), the right primitive iliac artery is altogether wanting; the aorta dividing into three branches, two on the right side, which are the hypogastric and the external iliac; the other, on the left, is the primitive iliac, and this is disposed in the ordinary way."*

Branches.—The common iliac artery often gives to lymphatic glands and the ureter or the psoas muscle a small branch of the kind delineated in plates 53 and 55. An offset of larger size (generally one of the lumbar arteries), is in some instances derived from it (plate 57, figure 6).

COMMON ILIAC VEINS.

The arrangement of the veins which accompany the common iliac arteries is shown in plate 55.

The artery of the right side has more complicated connexion with veins than the left, for the latter has only its proper companion vein in its immediate neighbourhood, whereas the former has both the common iliac veins and the origin of the vena cava in contact with it. This arrangement is reversed where the vena cava is formed on the left side, as in cases described at page 427, et seq., and delineated in plate 58, figures 2 and 3. When the common iliac veins join at the upper part of the abdomen, instead of the usual position on the fourth or fifth lumbar vertebra, there is no material difference in the disposition of the veins with reference to the one artery and the other.

* "Anatomie descriptive, par J. Cruveilhier." T. 3, p. 186. Paris, 1836.

A common iliac vein is occasionally found to present what may be named a perforation, so that a space is formed through it, in which I have more than once observed a small artery to pass outwards. A larger extent of separation is sometimes met with, the trunk being parted into two equal divisions, which again coalesce after lying distinct and close one to the other for some distance; in this case the common iliac vein is in great part double. The two peculiarities now noticed, which may be considered different degrees of the same arrangement, are delineated in plate 58, figures 5 and 6.

INTERNAL ILIAC ARTERIES.

The usual course of the internal iliac artery is shown in plates 53 and 54, and the connexion with veins in plate 55.

The Length of this artery is worthy of particular attention, for the same reason that the length of other of the shorter arteries is so, viz. because the free space at each side of a ligature may determine the event in an operation for aneurism. Moreover, assuming other circumstances to be the same, (the place of division for example,) this additional importance attaches to the length of the internal iliac, namely, that, when short, it is deeply placed in the back part of the pelvis; whereas, when the length is more considerable, a portion of the artery is likely to lie above the pelvic cavity, and therefore would be more easily accessible to the surgeon.

The following summary of the table will show the length in inches of 297 cases :—

Not exceeding $\frac{1}{2}$ inch	7 (plate 58, fig. 1).
More than $\frac{1}{2}$, and less than 1 inch . . .	16
1, and not exceeding $1\frac{1}{2}$	195 (about $\frac{2}{3}$ of the entire number—plates 56, fig. 3; 57, fig. 6).
More than $1\frac{1}{2}$, not exceeding 2 . . .	57 (plate 56, fig. 1 and 2)
More than 2, not exceeding $2\frac{1}{2}$ . . .	18 (plate 57, fig. 7 and 9)
More than $2\frac{1}{2}$, not exceeding 3	4
	—— 297

The place of division varies considerably. It may be found as low as the margin of the sacro-sciatic foramen, as high as the upper margin of the sacrum, or at any intervening point. And the length within the pelvis, of the large branches (glu-

tial, sciatic, pudic), is inversely as the depth at which the parent trunk divides. The division is close to the sacro-sciatic foramen in plate 56, figures 1, 2, 3, and plate 57, figure 7; it is opposite the base of the sacrum in plates 59 and 60; and it occurs between those two points in plate 58, figure 1.

The place at which the internal iliac artery divides or gives off its large branches, is not devoid of interest in practical surgery, inasmuch as it is obvious that, if in two cases of equal lengths, the vessel divides in one opposite the inlet to the true pelvis, while in the other it sinks deeply into that cavity before dividing, the former would be reached with much more ease in a surgical operation. Two cases mentioned in my notes may be mentioned in illustration. The internal iliac of both measures an inch and a half. But, in one this artery leaves the external iliac nearly at a right angle, dips at once into the true pelvis, divides into branches near the sacro-sciatic notch, and may be said to be altogether in the pelvic cavity. In the other case, the internal iliac arising higher, lies parallel with the external iliac and close to this artery in the greater part of its length, and divides on a level with the upper margin of the true pelvis.

Relative lengths of the Arteries of the right and the left side.—A comparison of the internal iliac arteries one with the other in 137 bodies afforded this result:—

Both measured equally in	. . . .	48
The right exceeded the left in	. . . .	41
The left exceeded the right in	. . .	48
		— 137

Neither artery, therefore, habitually exceeds the other in length. It is shown that in a third of a considerable number of instances the lengths of both were equal, and that where a difference existed it was as often in favour of one as of the other, or nearly so.

Though a difference of length is observable in the greater number of bodies, it is for the most part inconsiderable in amount. Still we occasionally fall on examples of striking contrast, such as are represented in figures 8 & 9 of plate 57.

The Branches.—The internal iliac artery, in most cases, divides into two large parts, (one example, among many, will be found in plate 58, figure 1,) from which, branches are distributed to the viscera of the pelvis, and to the muscles connected with it, especially those on the posterior aspect. The branches not unfrequently take their rise without the occurrence of previous division of the trunk (plate 63, figure 3.)

There are in many cases one or more branches given from the artery, above its division. A branch so placed requires especial notice, because of the effect it might have in the event of a ligature being applied to the main vessel, and its presence was always looked for in the cases set down in the Table. One such branch was found in eighty instances—more than a fourth of the entire number noted—and it took its rise from various parts of the trunk, thus :—

A single branch arose from	the trunk	above its middle in .	16
"	"	at the middle or nearly so	44—(Plate 57, fig. 3 ; and 65, fig. 7).
"	"	below the middle . .	20—(Plate 56, fig. 3).
			—80

In a few instances (ten are marked in my notes) two branches were given in the course of the internal iliac artery, as illustrated in plate 57, figure 6 ; and in a smaller number, more than two presented themselves,—an example is afforded by the case delineated in plate 56, figure 1.

The branch most frequently found to arise in the manner here adverted to, namely, from the trunk before its division, was the ilio-lumbar ; the lateral sacral, and a visceral branch were likewise observed to occupy a similar position, but much more rarely.

Returning now to the branches furnished from the two primary divisions of the trunk :—They are numerous, and take their origin in an unusually small space. The visceral branches of the female pelvis are delineated in plate 59 and plate 63, figure 3 ; those of the male are contained in plate 60, and plate 63, figure 2. And the distribution of the branches to the gluteal and other muscles on the posterior aspect of the pelvis are represented in plates 76 and 77.

The vesico-prostatic, the pudic, and the obturator arteries being the only offsets of the internal iliac which have important bearings on some of the ordinary operations of surgery, will alone receive detailed observation in this work; moreover, as it is when emanating from the epigastric that the position of the last named of these vessels has particular interest for the surgeon, the remarks on it will be more appropriately placed in connexion with the study of that (the epigastric) artery.

Internal Iliac Veins.—The internal iliac artery is delineated in its usual connexion with the internal iliac and the external iliac veins in plate 55. I have more than once seen the internal iliac vein double, and the artery placed over or between the two parts. One such case has been sketched in in plate 58, figure 6.

PUDIC ARTERIES.*

The pudic artery and branches of the female body are represented in plates 59 and 63, figure 1; those of the male in plates 60 and 63, figure 2. A view of a small portion of the same vessel, obtained by dissecting on the posterior surface of the pelvis, is contained in plates 76 and 77; and the position of the branches, as well as of the artery itself in the perinæum is displayed in plates 61 and 62.

The origin of the pudic artery is from the anterior division of the internal iliac, and usually in connexion with the sciatic. The place at which it separates from this (the sciatic) varies, being in one case high in the pelvis and not far removed from the parent vessel (plate 60); in another, close to the sacro-sciatic foramen, (plate 63, figure 2); and in one instance and on the left side, I observed the separation to occur altogether outside the cavity of the pelvis. In my notes of this case, it is said "the pudic arises from the sciatic artery an inch beyond the point at which the common trunk has escaped from the pelvis. The coccygeal and the muscular branches

* "Truncus est, quem nos mallemus, ob nimis incertum mediæ, externæ, internæ, communisque pudendæ sonum, alio nomine vocare, ut arteriam pudendam simpliciter, rejectis prioribus omnibus nominibus." Haller. Fascic. iv., p. 35 n. 12.

usually furnished by the sciatic are given from an independent artery emerging from the pelvis, close to the sciatic." The pudic artery often springs from the internal iliac without any immediate connexion with the sciatic; an example is afforded in plate 59.

Deviations from the ordinary arrangement are not unfrequently met with. They are of various kinds, and, as has been stated, with regard to several other arteries, a gradation of change can be recognised among them.—Thus: the pudic artery having the accustomed course, and furnishing the usual branches, is reduced in size and is aided by a small accessory vessel, as shown in plate 64, figure 4, and 65, figure 1. Again: the artery is more defective, and fails to furnish one of the usual branches which then is derived from the accessory pudic. This arrangement is exemplified in plate 64, figure 5. In a more extended degree of the same form of departure from the usual conformation, the pudic artery ends with the branch given to "the bulb," and the two remaining branches are supplied as in the preceding cases (plate 63, figures 3 and 4, and plate 64, figure 3—the right side). Lastly, the pudic may terminate with the superficial artery of the perinæum, and the branches to the penis are then given altogether from the supplemental artery. This rare variety is illustrated in plate 64, figure 3—the left side.*

The form of the foregoing peculiarities which I have most frequently observed, is that in which the two terminal branches ("arteria profunda penis" and "dorsalis penis") were supplied by the accessory artery, instead of emanating from the pudic.—Other observations on this subject will be found further on, in the account of the "accessory pudic" artery.

Branches.—The various states of the principal branches being necessarily included to some extent in the remarks on the vessels from which they are derived—viz., the pudic and accessory pudic—special reference will only be made to one of

* In the foot note to page 398, mention is made of a drawing in the possession of Mr. Liston, which illustrates this condition of the vessels. It should have been added, that the ninth plate of Professor Monro's work ("Anatomy of the Pelvis of the Male, illustrated by nine Engravings," 2d Edit., 1827) is a representation of the same case.

them, the artery of the bulb. This branch requires separate consideration, chiefly in consequence of the connexion it has with the operation of lithotomy.

ARTERIES OF "THE BULB." ARTERIÆ CORPORIS SPONGIOSI.

The artery of the bulb has commonly somewhat more than the size represented in plate 62, and it springs from the pudic, opposite the point at which the urethra enters the "spongy" erectile tissue. The vessel ends, therefore, in that tissue, at some distance in front of the extremity of the bulbous enlargement; and this circumstance is very apparent when the bulb being large extends backwards more than usual towards the rectum.

From the more ordinary conformation here briefly stated, the artery of the bulb is often found to deviate more or less as follows: It is diminished in size (plate 64, figure 4, right side), and I have seen it in more than one instance altogether wanting on one side. On the other hand, more than one branch is occasionally to be met with; two are present in the fourth figure of the plate last referred to.

The variation of most importance in a surgical point of view consists in the change of position. Ordinarily, the artery of the bulb is so placed as to be a little in front of the point at which the knife is passed into the urethra in the operation of lithotomy; but in some instances, not of frequent occurrence, it takes its rise considerably behind the usual place of origin, and ascends obliquely in the manner shown in plate 64, figure 1. I have also observed the artery, after having taken origin as in the case just mentioned, to bend inwards for some space, and then turn upwards in a vertical direction to reach the bulb. See the second figure of the same plate. And Mr. Spence mentions an example of apparently greater curve. "In a subject" (he says) "which I dissected, the artery of the bulb arose from the pudic as usual, but then passed almost directly backwards to near the anus, whence it again curved upwards to gain the bulb."* I would add,

* "Remarks on the Sources of Hemorrhage after Lithotomy, by James Spence;" in the "Edinburgh Monthly Journal of Medical Science, edited by J. R. Cormack, M.D.," vol. i. p. 166, 1841.

with respect to the foregoing peculiarities of position and direction, that the first mentioned is the only one of which I have seen repeated examples.

Finally, the artery of the bulb may be found to arise from the accessory pudic; and when this happens, it lies, so far as my observation goes, somewhat in front of or above the position it occupies under the ordinary circumstances.

ACCESSORY PUDIC ARTERY.

I venture thus to designate the vessel observed from time to time to take the place of a defective pudic artery. Though the instances of the occurrence of this artery are not frequent, and its presence must be considered much more the exception than otherwise; still the connexion the vessel may have with the operation for stone entitles it to separate mention in a work chiefly occupied with the anatomy which has immediate reference to operative surgery.

Origin.—In this respect the accessory pudic varies, like most of the usual branches of the internal iliac. In one case it arises, with the other branches, from the internal iliac; examples will be found in plate 63, figure 5, and in Professor Tiedemann's thirtieth plate. In another much more rare variety, it is furnished by the external iliac artery, through the medium of the obturator (plate 65, figure 1); and in one instance I observed it in a female to take rise from the epigastric.* But the most frequent place of origin among the instances of this peculiarity which I have observed, was the pudic artery itself, before its passage from the sacro-sciatic foramen, as shown in plate 63, figure 3.

The Course within the pelvis, towards the prostate gland, differs in different cases according to the place of origin. Most frequently the artery proceeds forwards near the lower part of the urinary bladder; it lay on the side of that organ in the body from which figure 5 in plate 63 has been drawn; and when placed at the anterior part of the pelvis arising from the obturator or epigastric, it descends immediately

* A drawing of this case, now before me, has been accidentally omitted from the plates.

behind the body of the pubes.—(See the plates already referred to.)

In passing by the prostate and urethra—and it is here that the exact situation of this artery is of serious concern to the practical surgeon—the accessory pudic lies on the upper part of the gland, or, it may be, for a short space likewise on the posterior margin; and then proceeding forward above the membranous part of the urethra, it reaches the perinæum and divides into the terminal branches. The position of the artery in the portion of its course here adverted to is illustrated in plate 63, figures 3 and 5, and plate 65, figure 1; and the point where it appears in the perinæum is shown in plate 64, figures 3 and 4.

I have not seen the accessory pudic artery approach the side of the prostate in any case but one, and of this a drawing is given in plate 63, fig. 4.

Branches.—The accessory pudic has in some bodies the course of the vesico-prostatic, and, being substituted for this artery, or, more properly, perhaps, an extension of it, furnishes branches to the same organs in the pelvis. This circumstance is in part exemplified in plate 64, figure 3. As regards the terminal branches,—those, namely, which supply the penis or clitoris,—their number depends on the state of the pudic artery, and is therefore very various. There may be but a single slender branch in connexion with the ordinary number from the pudic; or one, two, or three branches absent from the artery just named are furnished from the supplementary vessel. These different states have been noticed, and references to illustrative figures have been made in the observations on the pudic artery.

In one case the plan of arrangement did not conform with that above pointed out; and it therefore requires separate mention. A single accessory pudic took, in part, the place of the pudic artery of both sides, supplying both the "cavernous" arteries (arteriæ profundæ penis); and the pudic of the right side gave both the "dorsal" branches (plate 63, figure 5).

VESICO-PROSTATIC ARTERIES. ARTERIÆ VESICALES IMÆ.

The vesico-prostatic is the lowest of the three vesical branches usually recognised in anatomical works. Its position and size, together with the distribution of the branches, are displayed in plate 16, figure 2.

The branches on the prostate are in some bodies of fuller size than usual; and a communication or anastomosis may be found to exist above and even below the prostate gland or the neck of the bladder between the arteries of the right and left sides, in the manner exhibited in plate 60. One of the prostatic arteries will occasionally be observed to exceed the others in size. Concerning such a branch a statement of the following kind occurs with respect to a few cases in the notes of my observations. "A good-sized branch runs over the lateral and the inferior surface of the prostate gland." A similar branch has been described by Mr. Spence. In the essay already quoted, this writer observes, "In several instances I have seen the prostatic artery gain the perineal surface of the prostate without dividing into minute branches; and in eight of these cases the vessel was fully as large as the artery of the bulb."

I may here observe that my attention was forcibly directed a few years ago to the small arteries on the prostate gland, by the following case:—The lateral operation for the removal of a calculus from the urinary bladder was followed by extensive hæmorrhage, and the patient, a very young man, died in two or three days. On examining the body, diffusive inflammation from infiltration of urine was discovered in the pelvis, and the arteries in question were clearly ascertained to be the source from which the hæmorrhage had proceeded. The larger arteries, it should be added, were untouched in the operation, and the veins were not enlarged.

Before ending the account of the arteries, which have now occupied attention at some length, one further circumstance claims attention, namely, the connexion existing between them. Haller described small branches extending onwards from

the prostate to anastomose with the arteries of the penis.* A communication of this kind between the vesico-prostatic and the pudic arteries would be interesting, inasmuch as its presence would furnish means of demonstrating the manner of the production of some forms of the accessory pudic,—on the principle pointed out when treating of several other arteries. In connexion with this subject mention should be made of the junction which careful dissection will show to be present in most instances, perhaps in all, between the accessory pudic and the branches of the proper pudic artery. Such anastomosis existed in the cases delineated in plate 64, figures 3 and 4, and it is clearly represented in the former of these figures.

Veins.—The veins in the neighbourhood of the urinary bladder and the prostate are usually enlarged in aged persons, and in some forms of disease. They may be found so numerous and large as entirely to cover the gland: this is the case in the preparation from which figure 3, in plate 65, has been sketched. Moreover, fibrous membrane (fascia) covers the veins in this situation, and is so blended with them, that, like those in some other parts of the body, they do not collapse when divided.—Practical inferences from the size and disposition of these vessels will find their proper place in another section of this work.

OBTURATOR ARTERIES.

Their Origin.—General abstract of the Table (page 405, et seq.) with reference to the place of origin.

The condition of the arteries of both sides of the body having been noted:—

Both were derived from the internal iliac	Male	49	93
	Female	44	
Both from the epigastric	Male	11	23
	Female	12	

* "Ergo a trunco eo hypogastricæ, qui proxime umbilicalem dabit, frequenter omnino prodit ima vesicalis, cuius ad partem inferiorem vesicæ antrorsum, versus urethram, inter vesicam et rectum intestinum, ad vesiculas seminales et ductum deferentem et prostatam, tam superius quæ propago cum arteria penis coit, quam inferius ad bulbum urethræ, ubi cum arteria ejus bulbi anastomoses habet."—Op. cit. Fascic. 4, p. 38, n. 16.

One from the int. iliac, the other from the epigastric	Male	Right being from iliac	5	36
		Left from iliac	11	
			—16	
	Female	Right from iliac	14	
		Left from iliac	6	
			—20	
One (the right) from the int. iliac; the other equally from the int. iliac and epigastric	Male		2	3
	Female		1	
One (the right) from the epigastric; the other equally from the int. iliac and epigastric	Female			1
One from the int. iliac; the other from the ext. iliac	Male			1
One from the epigastric; the other from the ext. iliac	Female			2

In the following cases, the condition of the artery of one side only is mentioned in the Table: —

The artery arose from the internal iliac	Male	12	21
	Female	9	
From the epigastric	Male	9	18
	Female	9	
From the internal iliac and epigastric at the same time	Male		1
From the external iliac*	Male	1	3
	Female	2	

From the same artery, by a common trunk with the internal circumflex of the thigh—I have met with one example of this peculiarity (plate 72, figure 4). The case in which it occurred was not one of those included in the Table.

Extracting from the foregoing abstract the sum of the examples of each kind of origin, and omitting the reference to the state in individual bodies, we obtain the following result :—

The place of origin of the arteries of both sides is noted in 159 bodies, making	318 instances.	
And that of the artery in one side only in	43 „	
The entire number	—361	
The obturator was derived from the internal iliac in	247—say as 2 in 3.	
„ „ from the epigastric	103—say as 1 in 3½.	
„ „ equally from the internal iliac and the epigastric (by two roots)	5	
„ „ from the external iliac	6	
	—361	
„ „ from the last-named artery, in combination with the internal circumflex—(see above).		

* Allan Burns states, that in two subjects he "had found the obturator artery rising from the superficial femoral artery at the distance of two inches below Poupart's ligament." 'Observations on the Diseases of the Heart,' &c.—Edinburgh, 1809, p. 315.

The statements above made, with regard to the frequency with which the obturator arteries arise from one source and another, agree, to a great extent, with the observations made by M. Jules Cloquet * on 250 bodies; and they do not very materially differ from the result of Hesselbach's (Adam Kaspar) account of the condition in 32 bodies. † Other writers, however, as Monro ‡ and Velpeau, § represent the proportions in which the epigastric furnishes the obturator to be widely different. But it must be borne in mind, that these anatomists confine themselves to general statements, and that, where facts of this kind are concerned, numbers only, and these deduced from cases noted—written down—while under observation, can be relied on.

Where the obturator artery is stated in the table and in the abstracts, to be derived from the internal iliac, it is to be understood that it was given from one of the large divisions of the trunk, not from the trunk itself. It has been set down in the manner in which it occurs merely for sake of the shortness which is obviously necessary in constructing a table.

As regards the epigastric artery, when affording origin to the obturator: it usually emanated from the external iliac, near Poupart's ligament, but occasionally from the same artery, at a

* "Recherches Anatomiques sur les Hernies de l'Abdomen." pp. 72, 73. Paris, 1817.

† "Die Sicherste Art des Bruchschnittes in der Leiste." Bamberg und Würzburg, 1819.

‡ "Baron Haller, Lieutaud, Richter, and Murray of Upsal, have described such an unusual origin of the obturator artery, but do not make mention of the proportion of cases in which it occurs.

"I have paid a good deal of attention to this department of anatomy. In my Observations on Crural Hernia (published in 1803), I have stated that I had not observed such a deviation from the usual distribution of arteries in above one of 25 or 30; and, according to subsequent observation, such a distribution of arteries occurs in one of 20 cases."

"The Morbid Anatomy of the Human Gullet," &c., p. 429.

§ "Mais la variété dont on a le plus parlé est celle où l'obturatrice et l'epigastrique naissent d'un tronc commun de l'iliaque externe. C'est en effet la plus fréquente. L'examen que j'ai pu en faire sur plusieurs milliers de cadavres, soit dans les hôpitaux, soit dans les amphithéâtres à dissection, soit à l'école pratique, ne me permet pas de dire qu'elle se rencontre une fois sur trois, ni sur cinq, ni même sur dix, mais bien seulement sur quinze à vingt." 'Médecine Opératoire,' t. ii, p. 410. Paris, 1832.

On the same subject, see Mr. Lawrence's "Treatise on Ruptures," 4th edition, p. 481. London, 1838.

much higher point (plate 66, figure 2, and plate 65, figure 5); and it was likewise found to deviate from the accustomed position in the opposite direction, taking origin from the femoral artery. In a few cases the epigastric and obturator had united to them the internal circumflex artery of the thigh; and they have likewise been found conjoined with the circumflex iliac. See the observations on the epigastric artery, p. 460.

The place at which the obturator separates from the epigastric, in other words, the length of their common trunk, will be noticed in a succeeding paragraph, in connexion with the course the artery follows, and the position it takes with respect to the femoral ring.

When derived singly from the external iliac, without connexion with the epigastric or any other branch, the obturator was found commonly to arise a little above Poupart's ligament; but it also—though rarely—took origin from that artery opposite the middle of the iliac fossa (plate 65, figs. 6 and 7).

The Gradation observable in the Changes of the Place of Origin.—At first sight the transfer of the obturator from the internal iliac at the back part of the pelvis, to the epigastric or external iliac in front of this cavity, seems a larger change in the place of origin than is met with in other vessels; but on closer examination and of a sufficient number of facts, it will be found that in reality there is a gradual transition from one of these states to the other, and it will perhaps be apparent that the principle determining this and other changes of the same nature is identical. To illustrate this statement, with respect to the artery under examination, the following cases have been selected.

a. The obturator being furnished from the internal iliac, a branch from it ramifies behind the pubes and anastomoses by one or more minute ramifications with similar offsets of the epigastric artery.

b. One of the anastomosing branches is slightly enlarged, and joins the two arteries more fully and directly than occurs in the preceding case, as shown in plate 66, figure 1.

c. The artery proceeding from the posterior part of the pelvis is diminished in size, and the communicating branch descending behind the pubes is proportionably enlarged, so that the obturator may be said to arise equally from the internal iliac and the epigastric arteries. This condition of the vessels is exemplified in plate 66, figure 3.

d. The posterior root decreases still further, and the anterior one enlarges so much, that the obturator may be properly said to arise from the epigastric, receiving a slender branch of communication from the internal iliac. See plate 65, figure 1, and 66, figure 2.

It must further be mentioned, however, that the obturator artery, when springing from either of the principal sources is often without an anastomosing branch from the other—at least it is so when the arteries are filled with ordinary coarse injection. But the communication is most probably never absent at an early period of the development of the vessels.

Course and position.—The observations to be made under this head will have reference to the obturator artery, only when it takes origin from the epigastric or external iliac, because it is in such case alone that it may have important bearing with respect to a surgical operation of ordinary occurrence.

When derived from the epigastric artery, the obturator as it descends into the pelvis is close to the femoral ring, and, therefore, in the event of femoral hernia being formed, would be closely connected with the neck of the hernial sac. It is clearly of much importance to determine the position which the artery would be likely to hold with respect to the tumor, and with the view of ascertaining the position in a certain number of instances, the materials for the table were collected. It is obvious that the distance between the obturator as it descends into the pelvis and the external iliac vein is the chief means of determining, as far as it can be done, whether in such a conformation of parts the artery would have hernia on the inner or the outer side. The vein was therefore taken as the point of reference for the cases marked in the Table; and the space between it and the obturator artery was

observed in each. In this way, 101 cases were noted; and they admit of being classified as follows:—

A. The obturator artery was close to the external iliac vein in 44 / at a short distance from it in 10 } 54
(Plate 66, figure 2).

B. " at a moderate distance from the vein . . in 37
(Plate 66, figure 1).

C. " at a considerable distance . . . in 10
(Plate 66, figure 3).

Now, if a hernia were present, no doubt can exist as to the position the artery would occupy in the first and the last of these classes. In the one it must have been placed to the outer side of the hernia, and therefore, in the event of strangulation occurring, would not have been endangered in an operation for the relief of this (plate 68, figures 1 and 2). In the other (the third class) on the contrary, the artery would lie in front and on the inner side of the hernia, and an incision made through the boundaries of the femoral ring in any allowable direction, must be directed towards that vessel. This will be evident on observing figures 3 and 4 of the same plate.

But as to the cases included in the second class—no inconsiderable number—such certainty respecting the position the obturator artery would have does not exist, notwithstanding that there is between it and the iliac vein an interval of sufficient size to receive a hernial protrusion. The grounds of the uncertainty which I believe to attach to this point will be found in the following observations.

In some cases—a small number—the obturator artery, crosses behind the femoral ring in such manner that it divides the aperture into two lateral parts, and the protrusion may therefore take place at either side of it; and if two small herniæ should be formed, it is even possible that one should be placed on each side of the artery. An example of two hernial sacs so disposed was observed by Allan Burns.*—(See plate 72, figure 2.)

* " I dissected the body of an aged woman last summer, in which I found one sac in the sheath of the lymphatics, and another in the sheath of the vein. In this subject the obturator and epigastric arteries came off by a short trunk from the external

In a large majority of the cases of the second class the artery lay close to the inner side of the funnel-shaped opening of the femoral canal, or but a short distance from it, but did not arch inwards beyond the opening, and there appeared to be much more space for the descent of a portion of the contents of the abdomen on the outer than on the inner side of the vessel; and yet, with a like disposition of the parts, a femoral hernia might not, I apprehend, have been placed in the former position, *i.e.*, outside the artery. With the intention of attempting to elucidate this point, I repeatedly made experiments on the dead body by forcing some convolutions of the small intestine towards the femoral ring, in order to ascertain the course any small piece that might be dislodged would follow. These trials were not in general satisfactory; but in a few instances, in which I succeeded in forcing a knuckle of intestine through the ring, I observed that the obturator artery at first prevented the protrusion, and on continuing the force, the intestine appeared to have a greater tendency, if it may be thus expressed, to pass to the inner than to the outer side of the vessel, although from appearances I had anticipated a different result. Under the influence of the pressure from above, the artery usually yielded, or retired towards the outer side, possibly because it is held more firmly on this side by reason of its connexions above with the epigastric artery, and below with the canal beneath the horizontal branch of the pubes; any yielding in the opposite direction, could be effected only by stretching of the coats of the vessel.

While engaged in these trials, I was led to form the opinion that, in the class of cases under examination, the position of the part to be protruded, or the direction in which it is impelled towards the aperture, has some influence in determining its bearing with respect to the artery.

The inferences, then, I am disposed to draw from the circumstances set forth are, that, though there should be a certain

iliac, and the obturator, in its way to the thyroid foramen, encircled the neck of the sac contained in the venous sheath. This new variety of arrangement shows that the general opinion respecting the safety of cutting towards the pubes, in those cases where the conjoined trunk of the epigastric and obturator is short, is not well founded."— Op. citat., p. 313.

amount of space between the obturator artery and the iliac vein, it does not necessarily follow that a hernia would have occupied that space in passing through the femoral ring; and further, that it is not possible in many cases, by the inspection of the parts in the dead body, to state with confidence in what position the artery would lie with reference to the hernia, in a living body, with a similar arrangement of the vessels and the femoral ring.—These observations cannot be closed without the distinct admission that the experiments above noticed have little in common with the circumstances under which a hernia is produced in the living body. And the conclusions arrived at, it should likewise be understood, are offered merely as suggestions of what appears most probable, or, in short, "guesses at truth." This I believe to be all the subject admits of.

What determines the Position of the Obturator Artery, with respect to the Femoral Ring? To this question attention has been directed by Professor Monro,* and other authorities of an older date, who connect the position of the artery with the length of the epigastric before the obturator arises from it,—in other words, the length of the common trunk of these two arteries. In order to satisfy myself on the subject, I measured the length of the common trunk, and, at the same time, noted the position the obturator had in several of the bodies which are set down in the commencement of the Table. The results were as follows :—

When the common trunk was of unusual length, say $1\frac{1}{2}$ inch, it arose from the external iliac artery above the ordinary position, and commonly was expended in reaching the lower part of the abdomen, where the course of the epigastric upwards behind the anterior abdominal wall begins; and the excess in length of the common trunk had not any apparent connexion with the position of the obturator—did not remove the artery to a proportional distance from the iliac vein (plate 65, figure 5). Again: the common trunk

* "When the trunk common to the obturator and epigastric arteries is of an inch or an inch and a half in length, the obturator artery is then situated between the symphysis pubis and the hernial sac." &c. Op. cit. p. 428.

having the accustomed place of origin, and being of what in such case should be considered considerable length ($\frac{3}{4}$ inch), the obturator artery was, in some instances, directed to one side, in others to the opposite side of the femoral ring, and likewise was observed to cross behind the middle of that aperture. And the same difference of direction and position was observable where the common trunk was very short ($\frac{1}{4}$ inch).

There is, in my opinion, little reason to doubt, that, if the direction of the obturator artery into the pelvis were the same in all cases, its position with regard to the femoral vein and the femoral ring would be determined or materially influenced by the place of its origin. But this is not the case: the direction is far from being invariable—in one instance, the artery curves at first outwards, towards the iliac vein; in another, it arches in the opposite direction, away from that vessel—and on this circumstance, namely, the direction, in a great degree depends the relation it may have to the neck of a femoral hernia. (See plates 65, 66, and 68).

I will conclude this discussion by referring to observations made on the subject of it by Mr. Lawrence, in the latest (fifth) edition of the book on "Ruptures," which has come under my notice since the foregoing observations were prepared for the printer.*

The remarks hitherto made have reference to the usual form under which the obturator artery has its origin in the inguinal region—viz., in connexion with the epigastric. It remains to notice the course it takes when derived immediately from the external iliac. And this may be done in a few words. In every instance which has come under my notice, the obturator artery was directed at once into the pelvis, or was curved at

* "While these sheets are passing through the press, Mr. Wormald pointed out to me in the dissecting-room of St. Bartholomew's, an example of the obturatrix artery arising from the epigastric. The former made a considerable sweep in turning down to the obturator notch, running behind the crural ring in such a manner that a protrusion might have taken place either on its inner or outer side. A similar arrangement is seen in four crural herniæ in the museum in which this origin of the obturatrix exists, the artery being on the outer side of the rupture in the one, and on the inner side in the other three. Mr. Wormald therefore infers that its situation, in relation to the neck of the sac, depends on the course and position of the vessel itself, and not as Dr. Monro has conjectured, on the length of the common trunk, which may vary from two lines to an inch and a half."—'Treatise on Ruptures,' 5th edit. p. 482. See, likewise, a remark of Allan Burns, quoted in the foot note *ante*, page 451-2.

first slightly outwards, away from the femoral vein, and therefore lay to the outer side of the femoral ring (plate 65, figures 6 and 7). My observation, in this regard, agrees with that of Allan Burns,* and is at variance with the statement of Dr. Monro.†

Branches.—Mention has already been made of branches ramifying behind the pubes, and of a communication with the epigastric artery. Besides these, and the ordinary muscular branches in which it ends, the obturator, in some rare cases, furnishes an offset to the side of the bladder, or to the iliac fossa; the branch given in the latter situation would occupy the place of the iliac part of the ilio-lumbar artery. The accessory pudic and epigastric have likewise been observed to take origin from it (the obturator). (See the remarks on these arteries, and plates 65, figure 1, and 72, figure 1.)

The Obturator Vein or Veins.—There are often two veins, one extending backwards with the artery to the internal iliac vein, while the other curves round the inner side of the femoral ring. This arrangement occurred frequently among the bodies occupying the commencement of the Table, and I soon ceased to note it. In one body the vein arching over the femoral ring was of large size, and it opened into the external iliac vein by two mouths.‡

EXTERNAL ILIAC ARTERIES.

The position of these arteries is exhibited in plates 53 and 54; and they are seen associated with veins in plate 55.

Length.—Although the length of an external iliac artery will be found to vary even to the extent of some inches, yet as it is always so considerable that, after a ligature has been applied, no insecurity can be apprehended by the surgeon on

* Loc. citat. p. 309. † Loc. citat. p. 430.

‡ This disposition of the veins is delineated in Camper's work "Demonstr. Anatom: Pathol." Lib. 2, tab. 1. The greater part of the figure has been copied, with acknowledgment, into Professor Monro's "Anatomy of the Pelvis of the Male," &c. (plate 4, figure 3); but, by some oversight, the veins are (in the copy) lettered and coloured as arteries, and the arteries, with a large lymphatic gland, are, in the same way, represented to be veins.

the ground of inadequate length, I considered it is unnecessary to make any large series of observations respecting this point. —The measurement in 127 cases is subjoined.

The artery measured . .	$2\frac{1}{2}$ inches . . .	in	1	
more than	$2\frac{1}{2}$ not exceeding	3	13	(plate 53)
more than	3 not exceeding	$3\frac{1}{2}$	38	
more than	$3\frac{1}{2}$ not exceeding	4	44	
more than	4 not exceeding	$4\frac{1}{2}$	20	
more than	$4\frac{1}{2}$ not exceeding	5	6	(plate 54)
more than	5 not exceeding	$5\frac{1}{2}$	5	
			127	

Independently of the general effect of the size of the body, which has its influence on this as on most other arteries, the length of the external iliac depends exclusively on the place at which the common iliac divides, for it does not suffer change in the place of termination—this being determined, not by the condition of the vessel, but by another structure (Poupart's ligament or the pubes) whose position is not liable to any changes peculiar to the individual, at least not to any material to the question before us. An exception may be claimed for those rare cases in which the "profunda femoris" arises above the abdominal wall; but even here, it would perhaps be convenient to regard the external iliac artery as ending in the usual place, and to consider the vessel to be double at the lower end.

THE BRANCHES.

The branches of the external iliac artery are few in number —ordinarily two, the epigastric and circumflex iliac—and they are usually given from the trunk, at or near its lower end.

The number of the branches varies not unfrequently, and may be either augmented or diminished. The augmentation of number assumes several forms, thus:—*a*. It occurs in consequence of the division of a branch ordinarily single into two parts, taking separate origin from the trunk. The branches liable to be so affected are the circumflex iliac and the common trunk of the epigastric and obturator (plate 65, figures 5, 6, 7; and 72, figure 4). *b*. A muscular branch for the psoas muscle is frequently added in the manner represented in plates 54 and 55. Such a branch was observed, in the case marked 191 in the table, to turn round the external

iliac vein, and enter the psoas muscle behind the vein. *c.* A branch (the internal circumflex) usually given from another source, occasionally increases the number of those furnished from the external iliac (plate 74, figure 2). This is a very rare variety.

As regards the diminution of the number of branches—this change is effected by the transfer of the epigastric or circumflex iliac to another artery, commonly the femoral.

It need scarcely be added, that, by the co-existence of a source of increase with one of diminution, the branches may be varied, whilst the number remains unaltered.

The position at which the branches usually spring from the external iliac artery is not often altered to any considerable extent. Occasionally, however, the epigastric, the circumflex iliac, or the obturator, or more than one of these at the same time, is observed to occupy a much higher position than usual, e. g. $1\frac{1}{2}$ inch, or even, though very rarely, $2\frac{1}{2}$ inches above Poupart's ligament (plate 65, figures 4, 5, 7). This fact may not be devoid of importance, with respect to the place of applying a ligature to the external iliac artery in a case of aneurism.

In the foregoing statements reference has been made to the branches collectively, as connected with the surgical anatomy of the artery from which they are derived; they will now be treated of individually and more in detail.

EPIGASTRIC ARTERY.

The place of origin of this artery was found among 213 cases inserted in the table to be—

$1\frac{3}{4}$ inch above Poupart's ligament*	in	2	(plate 65, fig. 5)
More than 1 inch, not exceeding $1\frac{1}{2}$ above same		6	
More than $\frac{1}{4}$, not exceeding 1		11	
$\frac{1}{4}$ inch and less.		28	
Close to or opposite the same structure . .		149	
Below it—from the femoral artery		16	(plate 67, fig. 4)
from the "profunda femoris" . . .		1	
		213	

* The case sketched in plate 65, figure 4, is an example of a still greater interval between the end of the external iliac and the origin of the epigastric. The branch arises above the middle of the parent artery, and about $2\frac{1}{2}$ inches from Poupart's ligament.

I have not observed any greater departure from the usual place of origin than the above-mentioned variations in the position on the same trunk. But a deviation of more extensive kind has been placed on record. In the instance alluded to, the epigastric was found to arise from the obturator, and through this artery from the internal iliac, see plate 72, fig. 1. This arrangement is mentioned by Dr. Monro,* and A. K. Hesselbach,† who observed each a single example of it. Another peculiarity of this artery is mentioned by M. Velpeau‡ as having been observed by Lauth. Here there were two epigastric branches, one furnished in the usual manner from the external iliac, the other from the internal iliac, and they were placed one at each side of the spermatic cord (internal inguinal ring).

In the reports of the foregoing cases there are omissions requiring notice. It is not stated of the last mentioned (Lauth's) whether or not the usual epigastric branch took origin from the obturator artery; neither is it said if the two vessels were connected or not through small branches. The history of the other cases would have been more satisfactory if search had been made for a branch of communication of any kind between the epigastric and the external iliac. But even in the absence of the facts adverted to, the cases appear to belong to the same form of change. And there is much probability that they are examples of different stages in a series by which the epigastric is transferred from the external iliac to the obturator and internal iliac—stages of

* "I have a specimen in which the epigastric artery takes its rise from the obturator, and passes upwards and inwards to the rectus muscle."—Op. cit. p. 427.

† "Aus der hypogastrica kommt als erster Ast ein gemeinschaftlicher Stamm für die glutaea, sacra lateralis, und ileo-lumbalis—als zweiter Ast die umbilicalis, und so nah bei dieser, dass man wähnt, sie hätten beide nur einen Ursprung, als dritter Ast die obturatoria, welche sich, einen Zoll und vier Linien vom Ursprunge des innern Leistenbandes entfernt, in die eigentliche obturatoria und in die epigastrica theilt.

"Erstere steigt nach vorne herunter zum eiformigen Loch, letztere geht an der innern Seite der vena cruralis fort bis zum Leistenbande, wo sie sich umbeugt, und schief nach innen gegen die hintere Fläche des geraden Bauchmuskels aufsteigt."—The observation was made on the body of a female aged 26 years—the eighth case in the author's table.—Op. ante citat.

‡ "Tout récemment, M. Lauth m'a écrit qu'il en avait trouvé deux du même côté, l'une venant de l'hypogastrique, l'autre de l'iliaque externe, l'une en dehors, l'autre en dedans du cordon testiculaire."—Op. cit. p. 452.

similar nature, but in the opposite direction, to those through which the obturator has been shown to pass from connexion with the internal iliac into connexion with the epigastric and external iliac. The same fulness of demonstration which appeared in the changes of the obturator must not, however, be looked for in those of the epigastric, seeing that alterations of the former are numerous and constantly occurring, whereas alterations of the latter are very infrequent.

Direction and position.—The epigastric artery first attains the posterior surface of the wall of the abdomen, and then is directed obliquely upwards and inwards to the rectus muscle, behind which its further course is continued. To reach the abdominal wall, the artery, when it rises above the usual position, descends over the external iliac artery (plate 65, figure 4); and in reaching the same point, I have repeatedly seen it, after arising from the femoral artery, to pass at first behind the femoral or the external iliac vein.

The position of this artery in its course to the rectus muscle constitutes one of the most important points in the anatomical history of the ordinary forms of hernia.—It is shown in connexion with an oblique inguinal hernia, in plate 66, figure 4; and in plate 67, figures 2 and 3, are exemplified the changes of direction and situation the vessel undergoes under the influence of the same form of hernia, when it is of long standing, and its mouth becomes enlarged. The position the artery has with respect to direct inguinal hernia is exhibited in plate 67, figure 1. And the bearing with regard to femoral hernia is shown under various aspects in plate 67, figure 4, and the several figures of the 68th plate.

Branches.—Small branches of the epigastric artery ramify behind the pubes, and they will be found in many cases to anastomose with the obturator. The branches here adverted to differ in number, and somewhat likewise in size, but, except in cases in which one of them is enlarged, as occurs when a free communication exists with the obturator, in the manner of plate 66, figure 1, it is difficult to understand that death should result from the division of vessels so small in the short

incision required for the relief of strangulated femoral hernia Yet this is stated to have happened.*

I have met with an accessory pudic furnished by the epigastric; it was of small size, and descended behind the pubes to end in the clitoris.

The epigastric is occasionally connected with or gives origin to the internal circumflex (plate 74, p. figures 1 and 3); with that branch and the obturator at the same time (plate 74, figure 4). I have observed it joined with the circumflex iliac (No. 252 in the table), and it has been found united with the internal circumflex and circumflex iliac together.† The combinations of the epigastric with other arteries, except the obturator, are rare in their occurrence. With this (the obturator) it is associated very frequently, as has been fully made to appear in the account given of that artery (*ante*, page 446).

OBTURATOR ARTERY.

The obturator sometimes springs directly from the external iliac. Five instances are mentioned in the table. In three of these the branch was given off at the distance of $1\frac{1}{2}$ inch above Poupart's ligament (plate 65, figure 7); and in the others it arose near to the ligament (plate 65, figure 6).

For further details concerning this vessel, see the observations on it among the branches of the internal iliac artery.

CIRCUMFLEX ILIAC ARTERIES.

The following is an abstract of the Table, with respect to the place and manner of origin of the circumflex iliac artery.

The origin was—

More than $\frac{1}{2}$-inch, not exceeding 1, above Poupart's ligament, in	7 cases.
$\frac{1}{2}$-inch, and less . . . . . in	20 —
Opposite the same structure or nearly so . . . . in	147 —
Below it, (from the femoral artery) . . . . . in	19 —

* "Chez quelques sujets, l'artère épigastrique naît de la partie antérieure de l'iliaque; il n'est pas rare alors qu'elle fournisse plusieurs petites branches irrégulières qui se portent vers la symphyse du pubis, en passant derrière le ligament de Gimbernat: on a vu le débridement porté sur ce ligament donner lieu à une hémorrhagie mortelle due a la section de ces artérioles." — 'De la Médecine Opératoire, par R. B. Sabatier, nouvelle edition, faite sous les yeux de Dupuytren, par Sanson et Begin.' T. iii. p. 608. Paris, 1832.

† A. K. Hesselbach found the epigastric, obturator, and circumflex arteries springing from a single trunk in the body of a female (the twentieth case in the Table of the Essay before quoted).

Instead of a single branch, there were—

Two, having separate origin	in 12 cases.
Three distinct branches were present	in 2 —

Examples of double circumflex iliac, noticed at the end of the preceding abstract, are contained in plate 58, figure 1, and 72, figure 4.

Besides the variations of position and number above mentioned, the origin of this artery undergoes, very unfrequently, however, a change of different kind. This change consists in the connexion with other branches (the epigastric, or the epigastric and obturator, at the same time) in place of proceeding immediately from the external iliac.

Branches.—The principal branch arises usually near the anterior superior spine of the ilium, and is directed upwards through the abdominal wall, (plate 53, [18]). The size of this branch varies considerably: in the plate referred to it is of more than ordinary dimensions.* To this, (the abdominal branch of the circumflex iliac,) or the attendant vein, has been attributed the hæmorrhage found to attend the operation of paracentesis abdominis, when performed towards the lateral part of the abdomen, midway between the umbilicus and the spine of the ilium.†

The division of the circumflex iliac—for the artery might

* "Sometimes this branch is small; but at other times it is so large as almost entirely to annihilate the branch of the vessel which ought to follow the course of the crista ilii."—Allan Burns. Op. citat. p. 317.

"This vessel" (the large abdominal branch of the circumflex iliac) "seems to occur once in 200 cases, were I to conclude from those I have met with; though this artery, upon a small scale, may be detected often, and seems the cause of the bloody tinge which occasionally appears in even successful operation" (alluding to paracentesis abdominis).—Extract from an "Account of Unusual Conformations of some Vessels, by Alexander Ramsay, M.D., Lecturer on Anatomy, Edinburgh;" in "The Edinburgh Medical and Surgical Journal," vol. viii. p. 283. 1812.

† "The large ascending branch of the circumflex artery may be wounded in performing the operation of paracentesis of the abdomen. In one case I saw its accompanying vein opened by the trocar. The patient, a young woman, had the operation performed six times, and in all of them the perforation was made midway between the spine of the ilium and the umbilicus. At each time, the trocar was entered within the eighth part of an inch of where it had formerly passed. In the four first operations, the fluid was very readily removed without the effusion of any blood; but in removing the water the fifth time, it was found tinged with blood; and when the canula was withdrawn, a stream of venous blood issued from the wound. The further effusion of blood was prevented by pressure, &c. . . . . On inspecting the body after death, it was found that the stilet had punctured the ascending branch of the vena circumflexa ilii, which was preternaturally large."—Allan Burns. Op. citat. p. 317.

be considered to divide where the large branch takes its rise —has in a few instances been observed to occur close to the external iliac trunk, in the manner of the case drawn in plate 73, figure 1; and this premature division may doubtless be looked on in the light of an intermediate stage or step to a peculiarity before indicated, namely, the entire separation into two parts having distinct origin.

In a former paragraph, this artery has been described as entering into unusual combinations with other arteries at its origin. There are some others with which, likewise, it has been observed to enter into connexion, but these arteries are here set down among the branches of the circumflex iliac, because, while it retains the ordinary position, they are removed to some distance from their accustomed place. These unusual branches are the internal circumflex, and the external circumflex. See the remarks on the "profunda femoris" and its branches, as well as plate 74, figures 1 and 5.

Still another unusual branch seems to require notice. Dr. Monro, in the work already more than once referred to, mentions one which took a very unexpected course, in the following words: "I have seen a branch of this artery nearly as large as the epigastric, pass under the crural arch, about two inches from the symphysis pubis, and it then divided into branches which were distributed upon the symphysis pubis," &c.; and the branch is, at the same time, spoken of as one which "may be divided in performing the operation for the crural and inguinal herniæ."

EXPLANATION OF PLATE LXIX.

The femoral artery of the left side and its branches are displayed in this plate. The fascia, the veins, and the greater part of the nerves, with a portion of the sartorius muscle, were removed. The lower part of the artery was not brought into view, a part of the fibrous membrane, extending from the adductor longus to the vastus internus, having been allowed to remain over it.

a External oblique muscle of the abdomen.
b Sartorius.
c Iliacus internus.
d Pectineus.
e Adductor longus.
f Gracilis.
g Rectus femoris.
h Vastus internus.
i Tensor fasciæ latæ.
k Spermatic cord.

ARTERIES.

1. Common femoral.
2. Superficial femoral.
3. External pudic.
4. External epigastric.
5. External circumflex-iliac.
6. Profunda femoris.

6†. The same artery below the origin of the internal circumflex and external circumflex branches.

7. Internal circumflex.
8. External circumflex.

9. Femoral vein, the upper and the lower ends.

10. Anterior crural nerve.
11. Long saphenous nerve.

EXPLANATION OF PLATE LXX.

The upper part of the femoral artery of the right side is here represented with the fascia lata, the superficial and deep veins, and some lymphatic glands.—A portion of the fascia was cut away, and the fibrous sheath of the femoral vessel was laid open.

a Superficial fascia.
b External oblique muscle of the abdomen.
c Fascia lata, cut.
c† External or iliac part of the fascia lata, where it is blended with the inner side of the funnel-shaped sheath of the femoral vessels.
d Sheath of the femoral vessels laid open.
d† Partition of the sheath separating the femoral artery and vein.
e Sartorius muscle partially exposed.
f Anterior superior spinous process of the iliac bone.
g Spermatic cord.

ARTERIES.

1. Femoral.
The superficial arteries of the inguinal region are likewise shown, viz., the pudic, circumflex-iliac, and epigastric.

VEINS.

2. Femoral.
3. Long saphenous.
4. An accessory saphenous.
5. Superficial or external epigastric.
6. — circumflex iliac.

EXPLANATION OF PLATE LXXI.

a External oblique muscle of the abdomen.
b Anterior superior spinous process of the iliac bone.
c Spermatic cord.
d Fascia lata.
e Sartorius muscle.
f Iliacus internus.
g Rectus femoris.
h Pectineus.
i Adductor longus.
k Adductor magnus.
l Gracilis.
m Vastus internus.

ARTERIES.

1. Femoral.
1†. Two trunks, into which the superficial femoral divides.
2. Profunda femoris.
3. External circumflex.

VEINS.

4. Femoral.
5. Saphenous.
—
6. Anterior crural nerve.

Figure 1 is the representation of deeper dissection of the veins and nerves in the neighbourhood of the femoral artery, than that exhibited in the preceding plate.

Figure 2 is an example of double femoral artery. Below the origin of the "profunda," the superficial femoral artery divides into two equal parts, which reunite at a short distance above the place where the adductor magnus is perforated by the vessel.

EXPLANATION OF PLATE LXXII.

The sketches marked 1 and 2 are supplemental to the illustrations of the anatomy of the epigastric and obturator arteries. The remaining figures show some of the variations in the place of origin of the "profunda femoris."

a Sacrum.
b Anterior superior spinous process of the iliac bone.
c Pubes.
d Poupart's ligament.
e Sartorius muscle.
f Adductor longus.
g Rectus femoris.
h h Sacs of two femoral herniæ.
i Pectineus muscle.
k Rectus abdominis — its posterior aspect.

ARTERIES.

1. External iliac.
2. Internal iliac.
3. Obturator.
4. Epigastric.
5. Circumflex iliac.
6. Superficial femoral.
7. Deep femoral—"profunda femoris."
8. External circumflex.
9. Internal circumflex.

VEINS.

10. External iliac.
11. Long saphenous.

Figure 1 has been copied on a reduced scale from an Essay of A. K. Hesselbach.* It represents the right half of the pelvis, and a part of the abdominal wall of an adult female body, seen on the inner or posterior surface. The object of the drawing is to show the epigastric artery taking its rise from the obturator—this being an offset of the internal iliac. From the place of its origin, the epigastric ascends obliquely to its usual position behind the rectus muscle, passing close to the external iliac vein.

Figure 2 has been reduced from the sketch given by Professor Monro,† of a case observed by Allan Burns. The

* "Die sicherste Art des Bruchshnittes in der Leiste, von Adam Kaspar Hesselbach."—Bamberg und Würzburg. 1819.

† "Mr. A. Burns observed this variety, and from his preparation the figure is taken" —in "The Morbid Anatomy of the Human Gullet, Stomach, and Intestines," by Alexander Monro, &c., p. 482 and plate 16, figure 2. Edinburgh, 1811.

obturator artery is placed between the sacs of two femoral herniæ.

Figure 3.—The deep femoral artery (" profunda femoris ") arises from the external iliac an inch above Poupart's ligament.

In figure 4 the same artery takes its rise at or under Poupart's ligament. The obturator and internal circumflex arteries arise by a common trunk which springs from the internal division of the main artery (superficial femoral), under Poupart's ligament.

Figure 5.—Here, three arteries, which in other cases are given from a common trunk (the profunda), take their origin from the main artery, separately and at considerable intervals. The internal circumflex arises at the distance of about half an inch from Poupart's ligament; the external circumflex at the distance of about two inches; and the origin of the third branch—the common trunk of the perforating arteries (profunda ?)—is four inches removed from the same structure.

Figure 6.—In this outline, representing the vessels on the left side, the same arteries are likewise seen to arise from the femoral artery separately; but the two circumflex branches are placed opposite one to the other, and the third (profunda ?) is not so far distant from the commencement of the femoral as in the case delineated in figure 5.

EXPLANATION OF PLATE LXXIII.

Some of the peculiarities which occur in the arrangement of the branches of the deep femoral artery are here displayed. But the figures were specially intended to illustrate the varied forms of the external circumflex.

a Anterior superior spine of the ilium.
b Pubes.
c Poupart's ligament.
d Sartorius muscle.
e Adductor longus.
f Femur.
g Rectus femoris muscle.
h Part of the fascia iliaca.

ARTERIES.

1. External iliac.
2. Internal iliac.
3. Obturator.
4. Circumflex iliac.
5. Epigastric.
6. Common femoral.
7. Superficial femoral.
8. "Profunda fermoris."
9. External circumflex, or the branches which represent it.
10. Internal circumflex.

VEINS.

11. External iliac.
12. Saphenous.
13. "Profunda."
14. Femoral.

Figure 1.—The external circumflex is given from the femoral separately, and above the origin of the profunda.

Some circumstances connected with other vessels in this figure are not undeserving of notice: Several branches arise close to Poupart's ligament. The circumflex iliac artery divides immediately after its origin into two branches of considerable size. From the epigastric, a long slender branch runs backward on the outer part of the external iliac vein. It supplies the lymphatic glands. The position which the "profunda," the femoral, and the external iliac veins hold with respect to the arteries is fully displayed.

Figure 2.—Here likewise several branches arise in the immediate neighbourhood of Poupart's ligament. The circumflex iliac consists of two separate parts, one of which springs from two short roots.

The external circumflex is represented by two branches having distinct origin: the descending branches, for the supply of the anterior and outer side of the thigh, arise from the femoral; the circumflex and ascending part, from the profunda.

This drawing was taken from a dried preparation.

Figures 3 and 4 represent portions of two femoral arteries of the right side—the oblique line at the top indicating the place of Poupart's ligament.

They are intended to show the external circumflex taking origin from the femoral artery in separate parts, and in different positions.

Figure 5.—The descending part of the external circumflex artery takes its rise above the profunda, and from this (the profunda) the remainder of the same artery, viz. the ascending and circumflex portion is given.

Figure 6.—Both the circumflex arteries are furnished from the common femoral, by a common trunk, which takes origin above the profunda.

The external circumflex appears here, as in several cases shown in preceding figures, in two parts having separate origin. The profunda is reduced to the trunk from which the perforating arteries are furnished.

EXPLANATION OF PLATE LXXIV.

This plate contains further illustrations of peculiarities occurring in the branches of the femoral artery,—particularly in the internal circumflex.

a Anterior superior spine of the ilium.
b Pubes.
c Poupart's ligament.
d Sartorius muscle.
e Adductor longus.
f Pectineus.
g Rectus femoris.
h Vastus internus.

ARTERIES.

1. External iliac.
2. Obturator.
3. Epigastric.
4. Circumflex iliac.
5. Superficial femoral.
6. "Profunda femoris."
7. External circumflex.
7¹. A branch of same, given from the circumflex iliac.
8. Internal circumflex.

Figure 1.—A portion of the external circumflex artery is given from the circumflex iliac. The internal circumflex is derived from the epigastric, and is directed backward between the femoral artery and vein. The arteries from which both these branches were furnished arose under Poupart's ligament; which was moved upwards while the drawing was made, in order that the vessels might be more fully displayed.

Figure 2.—In the preparation from which this outline of the arteries has been drawn, the internal circumflex of the

left side takes origin as a separate branch from the end of the external iliac artery.

Figure 3.—The internal circumflex arises from the epigastric artery, and curves over the femoral vein.

Figure 4.—The epigastric, obturator, and internal circumflex arise from a common trunk, under Poupart's ligament. This structure was raised during the delineation in order to expose the branches. The internal circumflex turns round the femoral vein in passing backwards to its destination.

The sartorius muscle in this case is directed towards the inner side of the limb more speedily, and covers the femoral artery at a higher point than usual.

Figure 5.—The internal circumflex branch is given by the circumflex-iliac. It was directed inwards behind the femoral artery and vein.

EXPLANATION OF PLATE LXXV.

Some peculiarities in the conformation of the femoral vein are represented in this plate. All the figures are drawn on a reduced scale, in the same manner as the veins of other parts.

a Anterior superior spine of the ilium.
b Pubes.
c Poupart's ligament.
d Sartorius muscle.
e Adductor longus.
f Rectus femoris.
g Vastus niternus.

1. Femoral artery.

VEINS.

2. Femoral.
2†. Divisions of the same.
3. Saphenous.

Figure 1.—The femoral vein divides into two equal parts, which after lying close together for the space of about two inches, again unite into a single trunk.—A portion of the artery was removed for the purpose of more fully displaying the veins.

Figure 2.—In the case here delineated the principal vein divides and the parts reunite, in the same manner as in the preceding figure; but one of the divisions turns obliquely over the femoral artery.

Figure 3.—The femoral vein is double in the greater part of its extent, so that the artery lies over two large veins.

Figures 4 and 5.—Small venous branches pass in different directions across the femoral artery. Several of these open into the femoral vein at both ends.

EXPLANATION OF PLATE LXXVI.

This plate shows the arteries on the back part of one (the right) side of the pelvis, the gluteus maximus having been removed. The upper and lower ends of the muscle still remain, and on the left side it is seen entire.

The integuments having been taken from the lower part of the thigh, the fascia is displayed; and the appearance of the ham-string muscles, and of the entrance to the popliteal space before the division of that membrane, is discernible.

The lower part of the rectum was brought into view, in consequence of the previous dissection of the perineum.

a Gluteus maximus muscle.
b Gluteus medius.
c Pyriformis.
d Obturator internus.
e Gemellus superior.
e' Gemellus inferior.
f Quadratus femoris.
g Great sciatic ligament.
h Tuberosity of the ischium.
i Smaller trochanter of the femur.
k Rectum (intestinum rectum).
l Great trochanter of the femur.
m Biceps femoris muscle.
n Semi-tendinosus.
o Gracilis.
p Part of semi-membranosus.
q Adductor magnus.
r Fascia lata, turned back.

ARTERIES.

1. Gluteal.
2. Sciatic.
3. Pudic—dissected out to a considerable extent. It is seen before emerging from the pelvis, and in turning upwards (after again entering it), on the inner side of the obturator internus muscle above the tuberosity and the ramus of the ischium. The pudic nerve accompanies the artery.
4. End of the internal circumflex.
5. Perforating branch.

NERVES.

6. Great sciatic.
7. Small sciatic.

EXPLANATION OF PLATE LXXVII.

A deeper view of the arteries of the back of the pelvis than the preceding one is represented in this plate. A considerable part of the popliteal artery has likewise been exposed; and, by the division and separation of the ham-string muscles, the arteries from the anterior surface of the thigh are displayed—most of them perforating the adductor magnus muscle.

a Crest of the ilium
b Tuberosity of the ischium.
c Great trochanter of the femur.
c† Small trochanter.
c‡ Great sacro-sciatic ligament.
d Gluteus maximus muscle.
e Gluteus medius—its lower end.
f Gluteus minimus.
g Pyriformis.
h Obturator internus.
i Gemellus superior.
i† Gemellus inferior.
k Tendon of obturator externus.
l Quadratus femoris.
m Adductor magnus.
n The conjoined upper extremity of biceps and semi-tendinosus.
n† Semi-tendinosus.
o Long head of biceps.
o† Short head of same.
q Semi-membranosus.
r Gracilis.
s Heads of gastrocnemius.
t Rectum (intestinum).

ARTERIES.

1. Gluteal.
2. Sciatic.
3. Pudic.
4. Internal circumflex.
5. Perforating arteries.
6. Popliteal.

NERVES.

7. Great sciatic.
7†. Small sciatic. It had fallen inwards from its natural position before the drawing was made.
8. External popliteal or peroneal.
9. Internal popliteal, or posterior tibial.
2. Two cutaneous branches, one being the short saphenous.

EXPLANATION OF PLATE LXXVIII.

a Semi-tendinosus muscle.
b Semi-membranosus.
b† Tendon of same.
c Biceps.
c† Tendon of same.
d Heads of gastrocnemius.
e Part of adductor magnus.
f Vastus externus.
f† Vastus internus.
g Upper end of plantaris.
h Popliteus.
i Tendon of sartorius.
k Tendons of gracilis and semi-tendinosus.
l Peroneus longus.
m Fibula.
n Fascia of the leg.
o Patella.

ARTERIES.

1. Popliteal.
2, 3. Superior articular.
4, 5. Inferior articular.
6. Sural branches.
7. Anastomotic.
8. Anterior tibial.
9. Posterior tibial.
10. Peroneal.

VEINS.

11. Popliteal.
12. External, or short saphenous.

NERVES.

13. Internal popliteal, or posterior tibial.
14. External popliteal, or peroneal.
15. Part of long saphenous.

Figure 1 is a view of the popliteal space of the left limb, and the artery is shown in connexion with the veins and nerves. The preparation consisted in the division of the integuments and fascia, and the removal of fat from around the vessels and nerves.

Figure 2.—The popliteal artery of the left side, and its branches fully exposed by the removal of the muscles, are here viewed from behind in connexion with the lower part of the

femur and the upper extremities of bones of the leg, together with portions of some of the muscles.

Figure 3.—The parts represented in the preceding figure are here shown from the inner side. The aponeurosis of the vastus internus was removed to some extent, in order to bring into view the arterial branches in contact with the femur.

EXPLANATION OF PLATE LXXIX.

The branches of the popliteal artery are exhibited in the first figure; and in the remaining figures some peculiarities of the artery are delineated.

a Femur.
b Fibula.
c Tibia.
d Patella.
e Part of adductor magnus muscle.
f Tendon of semi-membranosus.
g Popliteus.
h Tendon of Sartorius.
i Tendons of gracilis and semi-tendinosus.
k External lateral ligament of the knee-joint.
l Tendon of biceps muscle.

ARTERIES.

1. Popliteal.
2. Anterior tibial.
3. Posterior tibial.
4. Peroneal.
5. Superior external articular.
5†. Superior internal articular.
6. Inferior external articular.
7. Recurrent branch of anterior tibial.
8. Terminal branch of profunda femoris.

Figure 1 shows the ordinary branches at the outer side of the knee-joint.

Figure 2.—In this series of sketches, the intervals between the origin of the arteries of the leg are illustrated. The oblique line indicates the lower margin of the popliteus muscle. The distance of the division of the posterior tibial from the origin of the anterior tibial is observed to be gradually augmented from A to E.

Figure 3.—The popliteal artery divides behind the middle of the knee-joint, and the anterior tibial continues close by the larger vessel to the point at which it is directed forward to the fore part of the limb.

Figure 4.—The anterior tibial is directed under the popliteus muscle, and after passing in front of that muscle, reaches the anterior aspect of the leg in the usual position.

Figure 5.—In this example of premature division of the popliteal, the anterior tibial and peroneal form a common trunk.

Figure 6.—The posterior tibial, anterior tibial, and peroneal arteries, arise together from the end of the popliteal artery.

EXPLANATION OF PLATE LXXX.

The figures of this plate illustrate some of the peculiarities of the veins, and of one of the muscles in immediate connexion with the popliteal artery.

a Femur.
b Adductor magnus muscle, cut.
c Part of the gluteus maximus.
c† Vastus externus.
d Biceps.
e Semi-tendinosus.
f Semi-membranosus.
g Gastrocnemius.
g† An unusual (third) head for same.
h Plantaris.
i Soleus.

ARTERIES.

1. Femoral. | 2. Popliteal. | 3. Profunda femoris.

VEINS.

4. External saphenous.
5. Popliteal.
5†. Double popliteal.
6. Popliteal joined with the profunda vein.

NERVES.

7. Internal popliteal or posterior tibial.
8. External popliteal or peroneal.

Figure 1.—The position of the popliteal artery and vein is reversed. The artery is the more superficial and external, and the external saphenous vein turns round it to terminate in the large vein.

Figure 2.—The popliteal vein is double, and one of the parts lies at each side of the popliteal artery.

Figure 3.—The popliteal vein, instead of being placed with the artery in the same aperture of the adductor magnus, perforates that muscle much higher up, and joining the profunda vein, comes into contact with the femoral artery, for the first time, at the groin. The upper part of the popliteal and the superficial femoral artery are accompanied by two small venæ comites.

The external saphenous vein, instead of ending in the popliteal, joins with a muscular branch in the adductor magnus.

Figure 4.—A small unusual muscle arising from the inner condyle of the femur, separates the internal popliteal nerve from the blood-vesseis, and joins the anterior or deep surface of the gastrocnemius by a slender tendon. It may be considered a third head of the gastrocnemius muscle.

Figure 5.—A bundle of fleshy fibres, taking origin from the external condyle of the femur, crosses between the popliteal artery and vein, and is blended with the internal head of the gastrocnemius.

FEMORAL ARTERIES.

THE following Table has reference to the Deep Femoral arteries and two of the Branches usually derived from them—viz., the External Circumflex and the Internal Circumflex. Other Branches furnished by the Femoral arteries,—*e.g.*, the irregular "Muscular" branches, and those occasionally transferred to the Femoral from the External Iliac,—will be noticed in the Commentary. And in the same place will be found an explanation of the term "usual," often applied to the principal off-sets.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in Inches of Profund. fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
3b	L	under the ligament.		
5†	L		fr. Feml. under Poup. ligament.	usual.
8	L	2	usual.	fr. Feml. at same height as Profund.
9	R	2	usual.	usual.
	L	$2\frac{3}{4}$	usual.	fr. Feml. $\frac{3}{4}$ inch below Poup. ligt.
10	R	3	fr. Femoral above Profunda.	fr. Femoral above Profunda.
10a	R	2	in two parts: the descending one fr. Feml. close to Profund.	usual.
11	R	under Poup. ligament.		
	L	2	usual.	usual.
13b	R	$2\frac{1}{2}$		
14	R	1	fr. Feml. at same height as Profund.	usual.
	L	1	fr. Feml. at same height as Profund.	usual.
15	R	$2\frac{1}{2}$		
	L	1	in two parts: both arising fr. Profund.	fr. Feml. 1 inch below Poup. ligt.
15b	R	2	usual.	usual.
	L	$1\frac{1}{2}$	usual.	usual.
16	R	3		
	L	2		
19b	L	$1\frac{1}{2}$	fr. Femoral.	usual.
19c	R	$2\frac{1}{2}$	fr. Femoral above Profunda.	usual.
19e	R	2	fr. Feml. 1 inch below Poup. ligt.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
21	R	1	fr. Femoral below Profunda.	usual.
	L	1½	fr. Feml. at same place as Profunda	usual.
23	R	1¼	fr. Feml. 1½ inch below origin of Profunda.	usual.
	L	2	usual.	usual.
23a	R	1¼	fr. Feml. ½ inch below Poup. ligt.	fr. Feml. at same height as Profund.
	L		usual.	fr. Femoral.
26	L	3	usual.	fr. Femoral above Profunda.
29	R	1		
	L	1 above the ligament.		
30	R	1		
	L	2		
30a	R	2	usual.	fr. Femoral above Profunda.
	L	2	usual.	fr. Femoral above Profunda.
31	L	2	fr. Feml. 1 inch above Profunda.	
31*	L	2	fr. Femoral close to Profunda.	usual.
31†	R	2	usual.	fr. Feml. at same height as Profund.
31‡	L	2	usual.	fr. Feml. at same height as Profund.
31a	R	2	usual.	usual.
	L	under the ligt.	A descending br. arises above Poup. ligt.	usual.
31†	R	under the ligt.		
32	R	2		
	L	2		
32a	R	1		
	L	2	in two parts: both arising fr. Profund.	usual.
32b	R	1½		
33a	R	2	usual.	usual.
	L	2½	usual.	fr. Circumfl. iliac; and crosses inward behind Feml. artery and vein.
34e	L	1½	usual.	usual.
36	R	1½	in two parts: the descending one fr. Feml. below Profunda.	usual.
	L	1½	same as on right side.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in Inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
37a	R	2		
	L	2		
37b	R	$1\frac{1}{2}$	fr. Feml. at same height as Profund.	usual.
38	R	$2\frac{3}{4}$	usual.	usual.
	L	$2\frac{3}{4}$	usual.	usual.
40a	R	1	fr. Feml. at same height as Profund.	usual.
	L	1	same as on right side.	usual.
42	R	2		
	L	2	usual.	fr. Femoral above Profunda.
43	R	2	usual.	usual.
	L	$1\frac{1}{2}$	usual.	fr. Feml. at same height as Profund.
44	R	$2\frac{1}{4}$	.	
	L	1		
46	R	2	usual.	usual.
	L	$1\frac{1}{2}$	fr. Feml. at same height as Profund.	usual.
46a	R	under the ligament.		
47*	R	2	usual.	usual.
	L	2	usual.	usual.
48	R	3	usual.	fr. Femoral above Profunda.
48a	R	2	usual	fr. Feml. at same height as Profund.
	L	2	fr. Feml. at same height as Profund.	usual.
50	R	2	usual	fr. Feml. at same height as Profund.
	L	2	fr. Feml. at same height as Profund.	usual.
51	R	3	in two parts: a descending br. fr. Feml. above Profunda.	two branches; one (a small one) arises above Profunda.
	L	3	same as right side	usual.
52	R	$1\frac{1}{4}$	usual.	usual.
	L	1	usual.	usual.
53	R	$1\frac{1}{2}$	usual.	usual.
	L	2	usual.	fr. Feml. at same height as Profund.
54	L	2	usual.	usual.
55	R	$\frac{7}{8}$	in two parts: a descending br. fr. Feml. $1\frac{1}{2}$ inch below Profunda.	usual.
	L	$\frac{3}{4}$	usual.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
56	R	1½	in two parts; a descending br. arises fr. Feml. above Profunda.	fr. Feml. above Profunda.
	L	1½	usual.	usual.
57	R	1½	usua..	usual.
	L	1¼	usual.	usual
58	R	¾		
	L	1		
59	R	1½	in two parts: the descending one fr. Feml. at same height as Profund.	usual.
	L	2	fr. Feml. at same height as Profund.	fr. Feml. at same height as Profund.
60	R	1½		
	L	1½		
61	R	1½	usual.	fr. Feml. above Profunda.
	L	1½	usual.	fr. Feml. above Profunda.
62	R	¾	usual.	usual.
	L	1¼	usual.	usual.
63	R	2	in two parts: the descending one fr. Feml. 1 inch above Profunda.	fr. Feml. at 1 inch fr. Poup. ligt.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	2	usual.	arises fr. Profunda; and ascends to gain the intermuscular space, in which it is directed backwards.
64	R	1¾	usual.	fr. Feml. at same height as Profund.
65	R	1½	usual.	usual.
66	R	1		
67	L	3		
68	R	1½		
	L	1½		
69	R	1½	in two parts: both being fr. Feml.; the circumfl. part above Profunda, and the descending below same.	usual.
	L	2	usual.	usual.
70	R	2	fr. Feml. at same place as Profund.	ascends after its origin to insinuate itself betw. the psoas and pectineus muscles.
	L	4	fr. Feml. 2 inches below Poup. ligament.	fr. Feml. ½ inch below Poup. ligt.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
71	R	2	in two parts: the descending one fr. Feml. above Profunda.	usual.
	L	1¾	usual.	usual.
72	R	1¾	usual.	fr. Feml. ¾ inch below Poup. ligt.
	L	1½	fr. Feml. 1 inch below Poup. ligt.	fr. Feml. 1 inch below Poup. ligt.
73	R	2	usual.	fr. Feml. at same height as Profund.
	L	1½	usual.	usual.
74	R	1¼	usual.	usual.
	L	1	in two parts: one (a small br.) fr. Feml. above Profunda.	usual.
75	R	¾	usual.	usual.
	L	2	in two parts: the descending one fr. Feml. at 1¼ inch below Poup. ligt.	fr. Feml. 1½ inch below Poup. ligt.
76	R	1¼	usual.	usual.
	L	1¼	usual.	usual.
77	R	1½	usual.	usual.
	L	1½	usual.	usual.
78	R	1½	usual.	usual.
	L	1¼	in two parts: the descending one fr. Feml. 3 inches below Poup. ligt.	usual.
79	R	½	in two parts: the descending one fr. Feml. 1 inch below Poup. ligament.	usual.
80	R	2⅛	usual.	usual.
	L	2⅛	usual.	usual.
81	R	1¾		
	L	2¼	usual.	usual.
82	R	1¾	usual.	fr. Feml., a little above Profunda; is small.
	L	2	usual.	fr. Feml. a little above Profunda.
83	R	2	usual.	usual.
	L	1½	usual.	usual.
84	R	1½	usual.	usual.
	L	1	usual.	usual.
85	R	2	usual.	usual.
	L	2	usual.	usual.
86	R	¾	in two parts, both arising from Profunda.	fr. Feml. at same height as Profund.
	L	1	usual.	usual.
87	L	1	usual.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
88	R	1⅝	usual.	usual.
	L	2	usual.	usual.
89	R	2	in two parts: the descending one fr. Feml. a little above Profunda.	usual.
	L	1¼	in two parts: both arising fr. Feml.: the descending one above Profunda, the other (circumflex) below same.	usual.
90	R	1¼	usual.	usual.
	L		usual.	usual.
91	R	¾	usual.	usual.
	L	1	usual.	usual.
92	R	1¼	usual.	usual.
	L	1¾	usual.	usual.
93	R	1	fr. Feml. at same height as Profund.	usual.
94	R	2½	usual.	fr. Feml. 1 inch below Poup. ligt.
	L	1¼		
95	R	3	fr. Feml. 1 inch from Poup. ligt.	usual.
	L	1	usual.	usual.
96	R	1	usual.	usual.
	L	1	usual.	usual.
97	R	2	fr. Feml. at same height as Profund.	usual.
	L	2½	usual.	usual.
98	R	1½	fr. Feml. at same place as Profund.	usual.
99	R	1½	usual.	usual.
	L	1	usual.	usual.
100	R	2	usual.	fr. Feml. at same height as Profund.
	L	1	usual.	usual.
101	R	2	usual.	fr. Feml. 1 inch below Poup. ligt.
	L	1	in two parts: the descending one arising fr. Feml. 3 inches below Poup. ligament.	fr. Feml. at Poup. ligt.
102	R	1½	usual.	usual.
	L	2¼	usual.	fr. Fem. at 1 inch from Poup. ligt.
103	L	2	usual.	fr. Fem. oppos. Profun.
104	R	1¾	usual.	usual.
	L	1½	usual.	usual.
105	R	1½	usual.	usual.
	L	2	usual.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
106	R	1½	usual.	usual.
		1½	usual.	usual.
107	R	2		
108	R	1½	fr. Feml. at same height as Profund.	usual.
	L	2¼	same.	usual.
109	R	2¼	usual.	usual.
		2	usual.	usual.
110	R	1½	Descending part fr. Fem. oppos. Profunda.	usual.
	L	1	same.	usual.
111	R	1½	usual.	fr. Feml. oppos. Profun.
	L	1	usual.	usual.
112	R	1½	Descndg. part fr. Feml. at Poup. ligt.	
	L	2¼	usual.	usual.
113	R	2	usual.	usual.
	L	1½	usual.	usual.
114	R	1½	arises in two parts, from Feml.; circumflex at 1 inch fr. Poup. ligt.: and descnd. part at 3 inches.	usual.
	L	1½	usual.	usual.
115	R	1¾		
No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	1½	fr. Feml. at same height as Profund.	
116	L	1½	fr. Feml. at 3½ inches fr. Poup. ligt.	usual.
117	R	2	usual.	usual.
118	R	1½	usual.	usual.
	L	2	usual.	usual.
119	R	1½	fr. Feml. at same height as Profund.	fr. Feml. at same height as Profund.
	L	1½	Descndg. part fr. Feml. at 1 inch fr. Poup. ligt.	usual.
120	R	1¾	usual.	fr. Feml. at 1 inch fr. Poup. ligt.
	L	1¾	usual.	fr. Feml. at ½ inch fr. Poup. ligt.
121	R	1¼	Part fr. Fem. at Poup. ligament.	fr. Feml. at Poup. ligt.
	L	½	fr. Feml. at same height as Profund.	fr. Feml. at same height as Profund.
122	R	1½	usual.	usual.
	L	1¼		usual.
123	R	2	usual.	usual.
	L	1½	usual.	usual.
124	R	1½	usual.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	1	usual.	usual.
125	R	2	usual.	usual.
	L	1½	fr. Feml. ½ inch from Poup. ligt.	usual.
126	R	1½	fr. Feml. 2½ inches fr. Poup. ligt.	crosses pectineus and passes back to its inner side.
	L	1½	same.	same.
127	R	1½	fr. Feml. at 1 inch from Poup. ligt.	usual.
	L	1½	fr. Feml. at same height as Profund.	usual.
128	R	1¾	usual.	usual.
	L	1½	usual.	usual.
129	R	1½	usual.	usual.
	L	1	usual.	usual.
130	R	1½	usual.	usual.
	L	1	usual.	usual.
131	R	1¾	usual.	usual.
	L	1	usual.	usual.
132	R	1¼	fr. Feml. at 2½ inches fr. Poup. ligt.	usual.
	L	1¼	same.	usual.
133	R	2	usual.	usual.
	L	1¼	usual.	usual.
134	R	2½	usual.	fr. Feml. at 2 inches fr. Poup. ligt.
	L	2	fr. Feml. at same height as Profund.	usual.
135	R	1½	fr. Feml. at same height as Profund.	usual.
	L	1½	usual.	usual.
136	R	2	usual.	two brs.; one slender fr. Feml. at 1 in. fr. Poup. ligt.: other fr. Profund., and lower than usual.
	L	2¼	usual.	very small.
137	R	1½	fr. Fem. close to Profund.	usual.
	L	½	usual.	usual.
138	R	1¼	usual.	usual.
	L	1½	usual.	usual.
139	R	1¾	usual.	usual.
	L	1	usual.	usual.
140	R	1¾	usual.	usual.
	L	1¼	usual.	usual.
141	R	1	usual.	usual.
	L	¾	Part fr. Fem. at 2 in. fr. Poup. ligt.	usual.
142	R	1½	usual.	usual.
143	R	2½	usual.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	2½	usual.	usual.
144	R	1	Descend. part fr. Feml. at 1½ in. from Poup. ligt.	usual.
	L	1½	usual.	fr. Feml. at same height as Profund.
145	R	1¾	usual.	usual.
	L	1½	usual.	usual.
146	R	1½	usual.	usual.
147	L	1½	fr. Feml. at same height as Profund.	usual.
148	R	1½	usual.	usual.
	L	2	usual.	usual.
149	R	2	usual.	usual.
	L	2	usual.	usual.
150	R	1	usual.	usual.
	L	1	usual.	usual.
152	R	2	usual.	usual.
	L	1¾	usual.	usual.
153	R	1½	usual.	usual.
	L	1½	usual.	usual.
155	R	1	usual.	usual.
	L	1½	usual.	usual.
156	R	1	Br. to vast. intern. at 4 inches from Poup. ligt.	usual.
	L	1½	usual.	usual.
157	R	1	usual.	usual.
	L	1½	usual.	fr. Feml. at same height as Profund.
159	R	1½	usual.	usual.
160	R	1	fr. Feml. at 2 inches fr. Poup. ligt.	usual.
	L	1¾	usual.	usual.
165	R	½	fr. Feml. opposite Profunda.	usual.
	L	1½	fr. Feml. ¼ inch below Poup ligt.	usual.
166	R	1	usual.	usual.
	L	2	usual.	usual.
167	R	1½	usual.	usual.
	L	1	usual.	fr. Feml. at ½ inch below Poup. ligt.
169	R	¾	usual.	usual.
169m	R	1¾	usual.	usual.
	L	1½	usual.	usual.
169n	R	under the ligt.	in two parts: both from Femoral.	usual.
	L	1	fr. Feml. opposite Profunda.	usual
169o	R	2	fr. Feml. at 3 inches fr. Poup. ligt.	fr. Feml. at 1 inch from Poup. ligt.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	2	in two parts: one fr. Fem. the other fr. Profunda.	fr. Femi. at 1½ inch fr. Poup. ligt.
170	R	1	fr. Femi. opposite Profunda.	usual.
	L	¼	usual.	usual.
171	R	1¼	usual.	usual.
	L	1½	in two parts: both from Fem.: one at 1½ in. from Poup. ligt., the other 3 inches from same.	usual.
171†	R	1	in two parts: one (circumflex) from Profunda, the other (descndng.) fr. Femi. at 2 in. below Poup. ligt.	usual.
	L	¼	in two parts, fr. Profund. and Femi.; descending brs. fr. latter at 2 inches below Poup. ligament.	usual.
172†	R	1½	usual.	usual.
	L	1½	usual.	fr. Femi. at same height as Profund.
173	R	1½	usual.	usual.
		2	usual.	usual.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
173*	R	¾	usual.	usual.
		¾	usual.	usual.
174	R	1½	usual.	usual.
	L	1¼	usual.	arises from Epigastric.
176	R	1¼	usual.	usual.
	L	1	usual.	usual.
177	R	2	usual.	usual.
	L	2		
178	R	1½	usual.	usual.
	L	1¾	usual.	fr. Femi. at 1 inch below Poup. ligt.
179	R	1¼	usual.	usual.
	L	1	usual.	usual.
180	R	1½	usual.	fr. Femi. at 1 inch below Poup. ligt; is small.
	L	1¼	usual.	from Femi. above Profunda.
181	R	1¾	usual.	usual.
	L	1⅝	usual.	usual.
182	R	1½	usual.	fr. Femi. at same height as Profund.
	L	1¾	usual.	usual.
184	L	1¼	from Femi. a little below Profunda.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
185	R	1 3/6	from Feml. close to Profunda.	from Feml. a little higher than Profunda.
	L	1 5/6	from Feml. close to Profunda.	usual.
186	R	1½	usual.	from Feml. a little above Profunda.
	L	1	usual.	usual.
187	R	1	usual.	fr. Feml. at same height as Profund.
	L	1	usual.	usual.
189	L	1¼		
190	R	1½	usual.	fr. Feml. at same height as Profund.
	L	1½	usual.	as on right side.
191	R	1 5/6	fr. Feml. at same height as Profund.	usual.
	L	½	in two parts: both from Profunda: and descending pt. arises first.	usual.
192	R	1½	in two parts; the descending fr. Fem. above Profunda: rest from Profunda.	usual.
	L	2¼	usual.	usual.
193	R	1¼	usual.	usual.
	L	1½	Descending part from Feml. close to Profund.	usual.
195	R	1½	in two divisions: the dscndg. prt. fr. Feml. at 3 ins. below Poup. ligt.	usual.
	L	1½	A portion of dscndg. prt. fr. Feml. at 2 ins. below Poup. ligt.	usual.
196	R	1¼		
197	R	1½	usual.	usual.
	L	1½	usual.	usual.
198	R	1 7/8	usual.	usual.
	L	1	Descending prt. fr. Feml. at 2½ ins. below Poup. ligament.	usual.
200	R	1¾	usual.	usual.
	L	2	in two parts: one fr. Feml. 1 inch above Profunda.	usual.
201	R	1	usual.	usual.
	L	1½	usual.	usual.
202	R	1	usual.	fr. Feml. opposite Profunda.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
	L	$\frac{3}{4}$	in two divisions, given separately, by Profunda: the descending part arises above the other.	usual.
207*a*	R	$\frac{7}{8}$	fr. Femoral close to Profunda.	usual.
		1	usual.	usual.
207*b*	L	$1\frac{1}{2}$	usual.	usual.
207*c*	R	$1\frac{1}{2}$	fr. Feml. at same height as Profunda	usual.
	L	1	usual.	usual.
210	R	$1\frac{1}{2}$	usual.	usual.
	L	$1\frac{1}{4}$	usual.	fr. Feml. opposite to Profunda.
212	L	$1\frac{1}{2}$	usual.	usual.
213	R	1	in two parts, given separately, by Profunda.	fr. Feml. 1 inch below Profunda.
	L	1	usual,	fr. Feml. at same height as Profunda.
214	R	$\frac{1}{2}$	in two parts; the descending one arises fr. Feml. $2\frac{1}{2}$ ins. below Poup. ligt.	arises from Feml. at $1\frac{1}{8}$ inch below Poup. ligt.
	L	1	usual.	usual.
215	R	$\frac{3}{4}$	Descending brs. arise fr. Feml. in two parts, at $1\frac{1}{4}$ inch and $2\frac{1}{2}$ ins. below Poup. ligament.	usual.
	L	under the ligament	A descending br. fr. circumflex iliac; circumflex part fr. Feml. at $2\frac{1}{4}$ ins. below Poup. ligt.	usual.
216	R	$1\frac{1}{4}$	usual.	fr. Femoral opposite Profunda.
219	R	$1\frac{1}{4}$	usual.	fr. Feml. opposite Profunda.
	L	$1\frac{5}{8}$	A portion of descending branches is given separately by Profunda.	fr. Feml. at 1 inch below Poup. ligament.
222	R	$\frac{3}{4}$	usual.	usual.
	L	$1\frac{1}{4}$	usual.	usual.
223	R	$1\frac{1}{2}$	usual.	usual.
	L	$1\frac{1}{8}$	usual.	usual.
224	R	1	usual.	fr. Feml.
	L	$1\frac{1}{4}$	usual.	usual.
225	R	$1\frac{1}{4}$	fr. Femoral above Prof.	usual.
	L	1	fr. Feml. opposite Profunda.	usual.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
226	R	1½	fr. Feml. opposite Prof.	usual.
	L	1¾	usual.	fr. Feml. a little higher than Profunda.
227	R	1½	fr. Feml.	usual.
		1¼	usual.	fr. Feml. at ¾ inch below Poup. ligament.
228	R	1⅛	Descndg. prt. arises from Feml. in two brs.: one oppos. Profunda, the other at 3 inches below Poup. ligament.	usual.
	L	1⅛	arises in two parts from Profunda: the descndg. part being the first.	usual.
229	R	1	usual.	usual.
	L	1	usual.	usual.
230	R	1⅛	usual.	usual.
	L	1⅜	fr. Femoral close to Profunda.	usual.
231	R	½		
233	R	1⅛	usual.	fr. Feml.
	L	1	in two parts: the descndg. one fr. Fem. a little below Profunda.	fr. Feml. at ¾ inch fr. Poup. ligt.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
234	R	¾	usual.	from Feml. close to Prof.
	L	1¼	in two parts: descending one below Profunda.	usual.
237	R	1⅛	given fr. Prof. close to its origin.	usual.
241	L	1⅛	usual.	fr. Feml. opposite Profunda.
241′	R	1	usual.	fr. Feml. opposite Profunda.
242	R	1¼	Part of descendg. brs. fr. Feml. 2½ incb. below Poup. ligt.	usual.
242*	R	1½	fr. Feml. at same beigbt as Profund.	usual.
245	R	1½	usual.	usual.
246	R	1½	usual.	usual.
	L		usual.	usual.
247	L	1½	usual.	usual.
248	R	1	usual.	usual.
	L	1½	usual.	usual.
249	R	2	Dscndng. brs. with one ascndg. arise by a com. trunk fr. Feml. at 1 inch below Poup. ligt.	fr. Feml. at 1½ inch below Poup. ligament.

THE DEEP FEMORAL ("PROFUNDÆ") AND THEIR BRANCHES.

No.	Side of the body.	Distance in inches of Profund. fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c	Int. Circumflex—its manner of origin, &c.
	L	2	usual.	usual.
250	R	1¾	fr. Feml. by com. trunk w. Int. circumf. at 1 inch below Poup. ligt.; arises in two parts.	fr. Feml. at 1 in. below Poup. ligt., by a com. trunk with ext. circ.
	L	1½	arises in two pts. fr. Prof.	usual.
252	R	1¼	usual.	usual.
	L	1¼	usual.	usual.
253	L	1½	One of the descending brs. arises fr. Feml. ½ inch below Profunda.	usual.
254	L	1½	usual.	usual.
255	R	¾	usual.	fr. Feml. a little below Profunda.
	L	1½	fr. Feml. in two parts; one, which gives the circumflex and ascend. brs., arises at ½ inch below Poup. ligt.; the other, consisting of the descending brs., at 2¼ inches below same.	usual.
255′	R	1½	in two parts: one arising fr. Feml. above Prof.	

No.	Side of the body.	Distance in inches of Profund. fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
259	R	1½	usual.	usual.
	L	1½	usual.	fr. Feml. at same height as Profund.
260	L	1½	fr. Feml. at same height as Prof.	usual.
261	R	1	usual.	usual.
	L	1½	in two parts; descending one arises fr. Feml. at ¾ in. below Poup. ligt.	fr. Feml. at ¾ in. below Poup. ligt.
262	R	½	usual.	fr. Feml. a little above Profunda.
	L	1¾	fr. Feml. at same height as Profund.	usual.
263	R	1½	in two parts, both arising fr. Profund.	usual.
	L	1½	in two parts, both being fr. Profund.	usual.
264	R		usual.	usual.
	L	1½	usual.	usual.
	R	1¼	in two parts, both from Profunda: the descending one arising first.	fr. Feml. 1 inch below Poup. ligt.
	L	1½	same as right side.	usual.
267	R	1¼	from Feml. above Prof.	usual.
	L	1	from Feml. close above Profunda.	usual.

THE DEEP FEMORAL ("PROFUNDA") AND ITS BRANCHES.

No.	Side of the body.	Distance in inches of Profunda fr. Poup. ligt.	Ext. Circumflex—its manner of origin, &c.	Int. Circumflex—its manner of origin, &c.
268*	R	1½	in two parts, the descending one fr. Feml. ¼ in. below Poup. ligament.	fr. Feml. and is partly joined with Profunda.
	L	2	fr. Feml. ¾ inch below Poup. ligt.	fr. Feml. opposite ext. circumflex.
270	R	1½	usual.	usual.
	L	1½	fr. Fem. and in part joind to Profund.	usual.
271	R	1	fr. Feml. at ¼ in. below Poup. ligt.	usual.
	L	1¼	in two parts, both arising fr. Profund.	fr. Feml. a little above Profunda.
274	R	1¼	in two parts, fr. Feml.: one at same height as Profunda, the other 1 inch lower.	usual.
275	R	⅛	usual.	fr. Feml. close to Poup. lig.
	L	1⅜	usual.	fr. back part of Feml. under Poup. ligament.
277	R	1½	usual.	fr. Feml. ¾ inch below Poup. ligt.
	L	1½	in two parts: the circumflex br. fr. Profunda, the other fr. Feml. at same height as Profund.	fr. Feml. at same height as Profund.
283	R	½	usual.	fr. Femoral opposite Profunda.
	L	½	usual.	fr. Femoral opposite Profunda.
284	R	1½	usual.	usual.
	L	1½	usual.	usual.

* In this case the superficial femoral artery is divided at three inches below Poupart's ligament into two equal parts which re-unite a little above the foramen in the great adductor muscle.

POPLITEAL ARTERIES, AND THE ARTERIES OF THE LEG.

The explanation of the term "usual," in the following Table, will be found in the Commentary on the artery to which it is applied.

Number.	Side of the body.	Popliteal.	Anterior tibial.	Posterior tibial and Peroneal.
1†	R	usual.	is small and ends opposite ankle joint in the Antr. Peronl. wh. becomes the Dorsal artery of the foot.	Post. tibl. is very small; above lower ankle it receives fr. Peronl. a large br. wh. crosses obliquely inwards over the deep muscles. Peronl. reinforces Anterior Tibl. and Post. Tibl.
3b	L	usual.	usual.	Post. Tibl. is very small, and is joined above ankle by a large br. of Peronl.
4b	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
5*	R	usual.	usual.	usual.
	L		is of large size.	nearly usual.
5†	R		is very small, and is joined above ankle by a large Ant. Peronl.	Peronl. is large; its Anter. br. becomes the Dorsal art. of the foot.
	L		usual.	usual.

Number.	Side of the body.	Popliteal.	Anterior tibial.	Posterior tibial and Peroneal.
10	R	usual.	usual.	usual.
	L			
13a	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
15	R	divides into Ant. Tibl. and Peronl.	usual.	Post. Tibl. is wanting. At lower part of leg, Peronl. (which is of large size) sends inwards a large br. to take the place of the Post. Tibl.
30a	R	Each divides above the popliteus muscle		
	L			
31a	R	usual.	usual.	Post. Tibl. is wanting on both sides; Peronl. in each case takes the place of that vessel near the ankle.
	L			
31f	L	usual.	is small, and its place on the dorsum of the foot is taken by a large Ant. Peronl.	Ant. Peronl. becomes Dorsal art. of foot.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
32*a*	L	usual.	same as preceding.	same as preceding.
36	R	usual.	usual.	Post. Tibl. is very small, and is reinforced near ankle by Peronl., wh. is of proportionally large size.
	L	usual.	usual.	usual.
37a	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
37b			is of large size; and after penetrating to the sole of the foot gives more Digital brs. than usual.	Post. Tibl. is small, and is aided by Ant. Tibl. in foot.
40	R	usual.	usual.	usual.
	L	usual.	usual.	Post Tibl. is small, and is reinforced above inner ankle by Peronl.
40b	R	divides into Ant. Tibl. and Peroneal.		Post. Tibl. is wanting. Peroneal turns inwards above the ankle to give the Plantar arteries.
41	R	usual.	usual.	usual.
	L	divides into Ant. Tibl. and Peroneal.	usual.	Peronl. at lower part of the leg takes the place of Post Tibl. which is absent.
41a	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
44	R	usual.	usual.	usual.
	L	divides into Ant. Tibl. and Peroneal.	usual.	Peroneal takes place of Post. Tibl. near ankle. The latter artery is altogether absent.
48	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
50	R	usual.	usual.	usual.
	L	divides above the popliteus muscle.	arises above popliteus, and runs beneath (before) the muscle in its course to the fore part of the leg.	usual.
52	R		usual.	usual.
	L		usual.	usual.
53	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
54	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
55	R	usual.	usual.	Behind the ankle, Post. Tibl. is extern. to the nerve. Peronl. is small
	L	usual.	usual.	Peroneal is larger than ordinary.
56	R			usual.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
57	R	divides a little abov. popliteus muscle.	arises above popliteus, and passes under (before) that muscle.	usual.
58	R	usual.		Post. Tibl. is small, and is joined near the ankle by Peronl., which is proportionally large in size.
	L	usual.	usual.	usual.
*59	R	usual.		Post. Tibl. is extern. to nerve behind inner ankle. Peroneal usual.
	L	usual.	usual.	usual.
60	R			usual.
61	R	usual.	usual.	usual.
62	R	usual.	usual.	usual.
63	L	usual.	usual.	Anter. Peronl. wanting. Post. Tibl. usual.
64	R	usual.	usual.	usual.
	L		usual.	
65	R	usual.	usual.	usual.
	L		usual.	
66	L	divides behind knee joint.	at origin is conjoined with Peronl.	Post. Tibl. arises behind knee-joint. Pernl. forms a common trunk with Ant. Tibl.; Ant. Peronl. wanting.
67	L	usual.	usual.	usual.
68	R	usual.	usual.	usual.
69	L	usual.	usual.	usual.
70	R L	each divides into Ant. Tibl. and Peroneal.	on each side a Br. is given in place of Anter. Pernl.	Post. Tibl. wanting on both sides; and in each Peroneal takes its place above inner ankle. There is no Anter. Peroneal br.
71	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
73	R	usual.	usual.	nsual.
	L	usual.	usual.	usual.
74	R	usual.	usual.	usual.
	L	usual	usual.	usual.
75	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
76	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
77	L	usual.	usual.	usual.
78	R L	usual.	usual.	usual, except that Ant. Peroneal of left side is of considerable size.
79	R	usual.	is small, and does not furnish the Dorsal artery of the foot.	Ant. Peronl. is of large size, and becomes the Dors. artery of the foot.

* In this case, both superficial Femoral arteries are plugged with lymph; and the Profunda, its branches, and an artery in the sciatic nerve, are much enlarged in size. Through these vessels the injection was conveyed to the Popliteal and Tibial arteries.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
	L	usual.	usual.	usual.
80	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
81	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
82	R	On each side the artery is separated fr. the vein by a small slip of muscle which ends by joing. inner head of gastrocnemius.	usual.	usual.
	L			
83	R	usual.	at lower part of leg is directed outwards to fibula, and again crosses the foot inwards to reach the interval between first two metatarsal bones; —is small and gives no Digital brs.	usual, except that Post. Tibial furnishes all the Digital arteries.
	L	usual.	usual.	usual.
84	R	usual.	usual.	Post. Tibl. is small, and is joined near ankle by Peronl.; wh. is proportionally large.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
	L	usual.	is directed outwards to margin of fibula above malleolus: and after receiving a small Ant. Peronl. br., regains usual position on the foot.	usual.
85	R	usual.	gives a br. to take place of Anter. Peroneal.	Peroneal is small; gives no Anter. br. and ends above the ankle.
	L	usual.	usual.	usual.
86	R	usual.	usual, but is of large size on left side.	usual.
	L			
88	R	usual.	is of small size, and is expended on the dorsum of foot without giv. Digital. brs.	The Dig. brs. are all furnished fr. the two Plantar arteries.
	L	usual.	usual.	usual.
89	R	divides above popliteus muscle.	arises above poplitcus.	usual, except increased length of Post. Tibl.
	L	usual.	usual.	usual.
90	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
91	R	usual.	is large and compensates for small size of Post. Tibial.	Post Tibl. is small, and is aided in the foot by Ant. Tibl.; Peronl. does not join Post. Tibl.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
	L	usual.	usual.	usual.
93	R	usual.	usual.	Both usual on both sides.
	L			
94	R	usual.	usual, but that of left side is larger than ord.	usual.
	L			
95	R	usual.	usual.	usual.
	L	divides above popliteus. muscle.	arises above popliteus, and passes under (before) that muscle.	usual, except increased length of Post. Tibl.
96	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
97	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
98	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
99	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
100	R	usual.	Digital br. is joined by Int. plantr.	usual.
101	R	usual.	usual.	usual.
	L	usual.	usual.	usual
102	R	usual.	usual.	usual.
	L	usual.	gives Peronl. at origin.	Post. Tibl. does not give Peronl.
103	L	usual.	usual.	usual.
104	R	usual.	usual.	usual.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
	L	usual.	usual.	usual.
105	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
107	R	divides opps. middle of the knee jnt.	rises above popliteus, and sinks under that muscle.	usual, except increased length of Post. Tibl.
108	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
109	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
110	R	usual.	at lower part of leg is directed outwards to fibula; and turning inwards regains the accustomed position on tarsus. The nerve with a small Br. of the arty. holds the usualcourse.	usual.
	L	usual.	usual.	usual.
111	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
112	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
113	R	usual.	usual.	usual.
114	R		usual.	usual.
	L		usual.	

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
115	R	usual.		Post. Tibl. gives a Br. to outer side of os calcis. Peroneal is small, and its place is taken inferiorly by the br. of Post. Tibl.
	L	usual.	usual.	usual.
116	R	usual.		Peroneal divides below mid. of leg into two equal parts; one follows ordy. course, the other perforates flex. long. pollic., and runs along the margin of the fibula.
	L	nearly usual.		usual.
117	R	usual.	gives Peronl.; in other respects usual.	Peronl. arises from Ant. Tibial.
118	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
119	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
121	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
122	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
124	R	usual.	usual.	Peron. arises close to the origin of Post. Tibl.
	L	usual.	usual.	usual.
125	L	usual.		
126	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
128	R	usual.	usual.	usual.
129	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
130	R	divides into Ant. Tibl. and Peroneal.	usual.	Post. Tibial wanting. Peronl. is large, and at lower end of the leg sends a large offset to take the place of Post. Tibl.
	L	same as on right side.	usual.	same as on right side.
132	R	usual.	has ordinary size, and is joined near malleolus by a branch from Peron. which crosses tibia inwards.	usual, except that Ant. Peron. gives a br. which crosses tibia inwards and joins Ant. Tibial.
	L	usual.	usual.	
133	R, L	usual.	usual.	Peroul. is small in both legs.
134	R	usual.	gives Peronl. close to origin.	usual, except origin of Peroneal.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
	L	usual.	turns outwards to fibula at lower end of leg: and inclining inwards regains its usual place on tarsus.	usual.
135	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
136	R	usual.	usual.	usual.
	L	usual.	has usual size and is joined by a branch of Peronl. near ankle.	usual.
137	R	usual.		usual.
	L	usual.		usual.
138	R	usual.	usual.	Peron. arises near origin of Post. Tib.
	L	usual.		same as on right side.
139	R, L	usual.	usual.	In both legs the arteries are connected near the ankle by a thick branch wh. crosses over the deep muscles.
141	L	usual.	usual.	usual.
145	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
146	R	usual.	usual.	usual.
148	R	divides into Ant. Tibial and Peronl.	usual.	Post. Tibial is wanting; and Peronl. which is large, takes its place at lower end of the leg.
	L	usual.	is close to fibula at lower end of the leg and is there joined by a br. of Ant. Peronl.; inclines inwards to usual position over the tarsus.	Peron. arises close to origin of Post. Tibial.
149	R	divides into Ant. Tibl. and Peroneal.	usual.	Post. Tibl. wanting; Peroneal takes its place near the ankle.
	L	usual.	usual.	usual.
150	R		usual.	
152	R	nsual.	usual.	usual.
	L		usual.	
153	R	usual.	usual.	usual.
	L	usual.	is directed out to fibula at lower end of leg; again turns inwds. to take the usual place on the foot.	usual.
154	R	usual.		
155	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
157	R	usual.	usual.	usual.
	L		usual.	

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
165	R		usual.	
	L		usual.	
172	L	divides into three brs. —Pt. Tbl. Ant. Tibl. and Perl.		
174	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
175	R	usual.	usual.	usual.
176	L	usual.	usual.	usual.
177	R	usual.	usual.	usual.
	L		usual.	
178	R	usual.	is very small, and is expended at lower third of the leg.	Ant. Peronl. is large and gives a br. to take the place of Ant. Tibl. on lower part of leg and on foot.
	L	usual.	same as on right side.	same as on right side.
179	R	usual.	usual.	usual.
	L	usual.		usual.
181	R	A slip of muscle (3d head of gastrocnemius) turns round the artery — betw. it and the vein.		
185	R	usual.		usual, except that Post. Tbl. is placed to outer side of nerve.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
168	R	usual.		
	L	usual.	gives a considerable br. before reaching fore part of leg.	
188	R	usual.	usual.	usual.
189	R			Peronl. is a little larger than Post. Tibl., and joins it by a br. which is smaller than that on left side.
	L	usual.		Pernl. larger than Post. Tibl., and sends to it two brs. (a large and a small one); at lower part of leg, the former communicating br. crosses on the bone (tibia), the latter over the deep muscles.
191	R	usual.		
	L			usual; they communicate distinctly by a transv. br. above end of tibia.
192	R	usual.	usual.	Junction by an intervening br. is distinct, as in preceding case.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
195	L	usual.	usual.	usual.
197	R	usual.		usual.
	L	usual.		they join by a large br. at lower end of leg.
199	R	usual.		
200	R	the Int. Popl. nerve is to inner side of arty. (the sciatic divides close to pelvis).		
210	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
212	L	usual.	usual.	usual.
213	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
218	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
222	L	usual.	usual.	usual.
224	R	usual.	usual.	usual.
	L	usual.	is of small size.	nearly usual.
225	L	usual.	usual.	usual.
226	R	usual.	The nerve divides into two parts, which lie one at each side of arty.	

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
227	L	divides above Popliteus muscle.	gives Peroneal.	Peronl. arises in common with Ant. Tibial from outer division of Popliteal.
229	R	usual.	at lower part of leg is directed out to fibula, and is joined by br. of Ant. Peroneal; it then inclines inwards to regain usual position on the dorsum of foot.	
	L	usual.	is very slender at lower part of leg, and is joined by a large br. directed inwards from Ant. Peroneal.	usual, except large size of Ant. Peroneal.
230	L	usual.	usual.	usual.
231		usual.	usual.	usual.
233	R	usual.	usual.	nsual.
	L	usual.	usual.	usual.
237	R	usual.		Post. Tibl. is covered above ankle by a fleshy mass, continued from soleus to os calcis; in other respects usual.

Number.	Side of the Body.	Popliteal.	Anterior Tibial.	Posterior Tibial and Peroneal.
238	R	usual.	usual.	Post. Tibl. is very small, and re-inforced near the ankle by a br. fr. Peroneal.; which last is proportionally large.
	L	usual.	usual.	usual.
248	R	usual.	usual.	usual.
251	R		becomes very small at lower part of leg.	Ant. Peronl. is large, and joins Ant. Tibl. oppos. bend of ankle.
257	L	The artery is separated fr. the vein by a small muscular band—a third head of gastrocnemius.		
258		usual.	usual.	Post. Tibl. above inner ankle receives fr. Peron. a br. which crosses under deep muscles; & is thereby enlarged.
261	R	usual.	arises by a com. trunk with Peronl.	Peronl. is joined with Ant. Tibl. at origin.
	L	usual.	inclines outwards to fibula near ankle, and again turns inwards on tarsus.	
264	R	usual.	usual.	usual.
270	L	usual.	usual.	usual.
271	R	usual.	usual.	usual.
	L	usual.	usual.	usual.
274	R	divides above popliteus muscle.	arises in common with Peronl.	Peronl. is joined at origin with Ant. Tibl.
	L	usual.	usual.	Post. Tibl. is stopped with lymph at lower end of leg; but it has recvd. injection fr. the ankle onwards, through the anastomosing br. of Peronl., wh. crosses lowr. end of tibia.
276	R	usual.	usual.	usual.

Abstracts of this Table will be found in the Commentaries on the several arteries to which it refers.

EXPLANATION OF PLATE LXXXI.

This plate is intended to illustrate the anatomy of the arteries of the back part of the leg. The vessels are shown as they appear before and after the removal of the large superficial muscles.

Figure 1.—The small cutaneous arteries and nerves seen ramifying on the calf of the leg in plate 77, were removed from the body of which this figure is a representation; as was likewise the fascia covering the superficial muscles, and to a great extent that interposed between the superficial and the deep-seated muscles.

At the upper end of the drawing the popliteal artery and nerves are, in part, displayed; and, at the lower end, a portion of the posterior tibial artery and nerve has been brought into view.

In figure 2, the large muscles of the calf of the leg, with the exception of their attachments, having been removed, the vessels are more fully exhibited. The greater part of the popliteal artery, the division of that vessel, and the posterior tibial artery and nerve as far as the ankle, are fully shown. The upper and the lower ends of the peroneal artery are likewise under observation; the rest of this vessel being covered by the long flexor of the great toe.—The peroneal artery will be found more fully displayed by the removal of the muscle in the second figure of the eighty-third plate.

a Biceps muscle.
b Semi-membranosus.
c Semi-tendinosus.
d Gracilis.
e Sartorius.
f Gastrocnemius.
f† Tendo Achillis, and some of the muscular fibres which end in it, turned down.
g Plantaris.
h Popliteus.
i Soleus.
k Peroneal muscles.
l Long flexor of the great toe.
m Long flexor of the toes.
o Tibialis posticus.

ARTERIES.

1. Popliteal.
2. Posterior tibial.
3. Anterior tibial.
4. Peroneal.
4†. The same, extending to the outer side of the heel.
5. Sural branches.

VEINS.

6. Popliteal.
7. Short saphenous.

NERVES.

8. Internal Popliteal and Posterior tibial.
9. Peroneal.

EXPLANATION OF PLATE LXXXII.

This figure is a view of the anterior tibial artery and nerve on the fore part of the leg. After turning aside the integument and fascia, the vessel was brought into view by drawing outwards the long extensor muscle of the toes and the special extensor of the great toe.—The depth at which the vessel lies has been preserved in the drawing.

a Tibia.
b Fibula.
c Tibialis anticus muscle.
d Long extensor of the toes.
e Special extensor of the great toe.
f Fascia.
f† Anterior annular ligament.

ARTERIES AND NERVES.

1. Anterior tibial artery.
2. Anterior tibial nerve.
3. Musculo-cutaneous branch of the peroneal nerve.

The continuation of the anterior tibial artery to the foot (dorsal artery of the foot), and its branches, are displayed in plate 83, figure 3, and plate 84, figure 1. The recurrent branch will be best seen with the arteries of the knee in plate 79, figure 1.

EXPLANATION OF PLATE LXXXIII.

The figures of this plate continue the illustrations of the arteries of the leg from the two preceding plates.

a Tibialis anticus muscle.
b Special extensor of the great toe.
c Long extensor of the toes.
d Anterior annular ligament.
e Short extensor of the toes.
f Fascia covering the superficial muscles.
f′ The same structure extended between the superficial and the deep muscles.
f† Posterior annular ligament binding down the tendons, vessels and nerve.
g Gastrocnemius muscle.
h Tendon of the plantaris.
i Soleus.
k Tendo Achillis.
k′ The same turned down with some muscular fibres attached to it.
l Tibialis posticus.
m Long flexor of the toes.
n Long flexor of the great toe.
n† The same muscle cut and a part removed.
o Peroneus longus.
p Peroneus brevis.
q Tibia.

ARTERIES.

1. Anterior tibial.
1†. Dorsal artery of the foot.
1‡. The same penetrating between the first two metatarsal bones to the sole of the foot.
2. Posterior tibial.
3. Peroneal.

4. Long or internal saphenous vein.

NERVES.

5. Anterior tibial.
6. Posterior tibial.

Figure 1.—The posterior tibial artery is here seen in connexion with its companion-veins and the nerve. The integument and the fascia only have been removed; and the latter is observed to consist of two layers, one of which covers immediately the deep muscles and the vessels, and the other lies over the superficial muscles.

The tendons, the vessels, and the nerve are shown in their usual relative position above the annular ligament. Below this structure the nerve has separated into branches, and the artery is concealed by the venæ-comites.

Figure 2.—This figure is intended to show the peroneal artery more fully than it appears in plate 81. The more complete display of the vessel has been attained by the removal of a large part of the long flexor of the great toe. The terminal ramification of the artery on the outer side of the os calcis is likewise here exhibited.

Figure 3.—The lower end of the anterior tibial artery, with its continuation on the dorsum of the foot, is represented in connexion with the muscles and the nerve. The branches of the same artery are displayed in the first figure of the next plate,—in which it is placed in consequence of the want of room in the plate now under observation.

EXPLANATION OF PLATE LXXXIV.

In the first figure, the anatomy of the dorsal artery of the foot is continued from the last figure of the foregoing plate. The other drawings are representations of some of the peculiarities of the arteries furnished to the back part of the leg.

a Tibia.
b Fibula.
c Peroneus longus and peroneus brevis muscles.
d Long extensor of the toes.
d† Peroneus tertius—in this instance of much more than its ordinary size.
e Short extensor of the toes.
f Special extensor of the great toe.
g Tibialis anticus.
h Femur.
i Popliteus muscle.
k Tendo Achillis.
l Long flexor of the great toe.
l† Part of the same muscle turned down.
m Tendon of the plantaris—in this case ending in the fascia behind the inner ankle.
n Tibialis posticus.
o Long flexor of the toes.

ARTERIES.

1. Popliteal.
2. Anterior tibial.
3. External malleolar branch of the last-named artery joining with the anterior peroneal.
4. Tarsal branch of same.
5. Metatarsal branch.
6. Dorsal artery of the foot perforating in the first interosseous space to join the external plantar, and to furnish digital arteries.
7. Peroneal.
7†. A large branch of the same joining a defective posterior tibial.
7‡. A large branch of peroneal taking the place of the posterior tibial.
8. Posterior tibial.
8†. A large division of same, taking the place of a defective peroneal.

NERVES.

9. Posterior tibial.
10. Anterior tibial.

Figure 1.—By turning aside the tendons of the long muscles, and removing the short extensor of the toes with some fascia, the branches of the dorsal artery of the foot have been laid bare.

Figure 2.—The posterior tibial artery is of small size—wholly inadequate to the supply of the structures in the sole of the foot. The peroneal, on the other hand, has more than the usual dimensions; and from it, a large branch turns inwards over the long flexor of the great toe, to reinforce the defective vessel.

Figure 3.—Here the posterior tibial artery is altogether wanting and its place is taken by the peroneal. Along the leg, successive branches are given from the peroneal artery instead of those usually furnished from the posterior tibial; and to supply the plantar arteries, a large branch is sent from the same source. This (last) unusual off-set of the peroneal lies on the tibia, under cover of the long flexor of the great toe; and the removal of part of this muscle was required for exposing it.

Figure 4.—The peroneal artery is of small size, and ends above the ankle. The posterior tibial sends a considerable artery to the outer side of the os calcis, where a branch of the peroneal ordinarily ramifies.

EXPLANATION OF PLATE LXXXV.

The first figure of this plate shows an unusual mass of muscular fibres covering the posterior tibial artery. The remaining figures illustrate the peculiarities of the anterior tibial artery.

a Gastrocnemius muscle.
b Soleus.
b† An unusual mass of fleshy fibres, extending from the soleus to the os calcis.
c Plantaris.
d Fibula.
e Tibia.
f Tibialis anticus muscle.
g Long extensor of the toes.
g† Peroneus tertius.
h Special extensor of the great toe.
i Peroneus longus.
k Short extensor of the toes.

ARTERIES.

1. Posterior tibial.
2. Anterior tibial.
3. Anterior peroneal.
3†. Plantar, or perforating part of anterior tibial.
4. Metatarsal branches derived from the plantar.

NERVES.

5. Anterior tibial.
6. Posterior tibial.

Figure 1.—A thick bundle of muscular fibres (*b*†) continues from the inner side of the soleus, covering the posterior tibial vessels as far as the inner ankle. The fibres arise from the deep aponeurosis of the soleus, and end in a tendon which is

inserted into the os calcis on the inner side of the tendo Achillis.

In this figure, there is also a peculiarity in the relative position of the parts behind the inner ankle, viz. the posterior nerve lies nearer to the malleolus than the artery and its companion-veins.

Figure 2.—The anterior tibial artery, instead of continuing to the foot in a straight course over the lower end of the tibia at the middle of the bone, is directed outwards to the fibula, at some distance above the ankle-joint; and inclining again inwards, resumes its usual position on the tarsus. The nerve, with an arterial branch, continues the accustomed course where the main artery departs from it.

Figure 3.—This case differs from the preceding chiefly in these respects, viz. that the anterior tibial is joined, when close to the fibula, by an off-set of the peroneal from behind: and that the nerve is not accompanied by a branch of the artery.

Figure 4.—The anterior tibial artery is very small, and ends above the ankle by joining with the anterior peroneal, or rather with a branch, which turns upwards from this artery. The anterior peroneal artery is very large, and takes the place of the tibial opposite the ankle and on the foot. The same vessel has, in this instance, the additional peculiarity that it curves outwards on the dorsum of the foot, and regains the usual position of the dorsal artery only at the interval between the first and second metatarsal bones, where it penetrates to the plantar surface of the foot.

Figure 5.—The anterior tibial artery, which is very small in this instance, as in the last, is exhausted without forming any connexion with the anterior peroneal artery, which comes forward from the back of the leg to take the place of the defective vessel. The want of junction between the arteries, and the straight course of the anterior peroneal, distinguish this from the case represented in the figure immediately preceding.

Here there is another peculiarity of the vessels, for the branches over the metatarsal spaces are derived from the

plantar arch, and they penetrate to the dorsal surface between the "heads" of the dorsal interosseous muscles.

It will be observed, moreover, that the peroneus tertius (a muscle which not unfrequently presents some deviation from the ordinary arrangement) terminates on, or close to, the tarsal end of the fourth metatarsal bone.

EXPLANATION OF PLATE LXXXVI.

The drawings in this plate are illustrations of the anatomy of the arteries in the sole of the foot,—the first three exhibiting their usual arrangement, and the last two some deviations from it.

a Plantar fascia.
a† Plantar fascia, with two of the superficial muscles cut.
a‡ Plantar fascia, and the three superficial muscles cut.
b Abductor of the great toe.
c Abductor of the little toe.
d Tendon, the long flexor of the toes.
e Flexor accessorius.
f Tendon of the long flexor of the great toe.
g Short flexor of same.
h Tibialis posticus.
i Interosseous muscles.
k Peroneus longus.

ARTERIES.

1. Posterior tibial.
2. External plantar.
2†. Same, of very small size.
3. Internal plantar.
3†. Same, of larger size than usual.
4. Anterior tibial, joining the external plantar, and completing the plantar arch.
4†. Anterior tibial, taking the place of the external plantar, and forming the plantar arch.
5. Digital branches.

NERVES.

6. Internal plantar.
6¹. Digital branches of same.
7. External plantar.
7¹. Its digital branches.

Figure 1.—The plantar fascia is here displayed, the integument and fat only having been removed. At the inner side of the foot the internal plantar artery is partly exposed, the fascia being very thin in this situation; and between the middle and the outer divisions of the fascia, the external plantar has been brought into view by dividing the fascia. The rest of this artery (external plantar) is covered by muscular structure.

Figure 2.—With the plantar fascia two of the superficial muscles (the short common flexor of the toes and the abductor

of the great toe), have been in great part removed; and by their removal the arteries and the plantar nerves with their digital branches are exposed to some extent

Figure 3.—The external plantar artery lies fully exposed, as well as its connexion with the anterior tibial by means of which the "plantar arch" is completed. The vessels have been thus fully displayed by removing (besides the parts cut away for the second drawing) the tendons of the long flexor of the toes and the lumbricales, together with the plantar muscles of the great toe.

Figure 4.—The deviations from the ordinary arrangement of the arteries shown in this case are the following, viz.: the anterior tibial neither joins the external plantar artery, nor furnishes any digital branch; and the internal plantar, which has more than its accustomed size, gives the digital branches usually supplied by the anterior tibial.

Figure 5.—The external plantar artery is here observed to be very small, and it merely joins with the anterior tibial; while this vessel is of large size, and supplies all the digital branches. Moreover the part of the same artery (anterior tibial), which is seen to be directed outwards behind the fifth metatarsal bone, branched out in this case on the dorsal surface of the foot at its outer side.

EXPLANATION OF PLATE LXXXVII.

In this plate the arteries of the brain and spinal cord are represented.

The first figure, taken from the body of an emaciated child about twelve years old, is intended to shew the arteries which enter the spinal canal from different sources, for the supply of the spinal cord and the bones.

Dissection.—To expose the arteries which enter the canal, and the spinal cord, the canal was laid open in the following manner:—on the right side, the laminæ of the vertebræ were cut through, close to the transverse processes

On the left side the section of the bones was made likewise through the laminæ in the cervical region, but in the dorsal and lumbar parts of the column the vertebræ were divided nearer to the bodies—through their pedicles; on the same side the sacrum was sawed through at the foramina; and thus the intervertebral foramina of the left side by which the nerves and the vessels of the spine have their passage were laid open. The ribs were allowed to remain on the right side; only their heads were left on the opposite side.

The dura mater having been laid open, and the arachnoid dissected away, the spinal cord was laid bare.

The arteries.—It will be observed that the arteries, destined for the spinal canal, arise opposite different parts of the column; and, beginning at its upper part, that they emanate from—the vertebral [5]: the inferior thyroid [6]: a small spinal branch [7] proceeding directly from the subclavian: the intercostal arteries (the first of which is marked [8]): the lumbar (the first being marked [9]): the iliolumbar [10]: and the lateral sacral [12].

On the spinal cord small branches (posterior spinal) are seen to ramify. They are very slender and irregular, and they lie in double series close behind the posterior roots of the nerves. Near the lower end of the cord there existed, in the body from which the drawing was made, a larger branch immediately before the same roots of the nerves.

The intercostal and lumbar arteries divide close to the back part of the body of the vertebræ (as seen in the drawing on the left side) into two parts,—anterior and posterior branches. The latter (posterior) branches furnish the spinal arteries, and they appear behind the vertebræ, where they are distributed to the muscles. These muscular branches are displayed on the right side of the spine, the muscles having been separated from them; they here appear in most cases as two in number, the single branch having divided in its course backwards. The first of the branches derived from the intercostal arteries is marked [8t]: it occurs in the second intercostal space. The branch [8r] penetrating between the first two ribs, or between the transverse processes of the

first two dorsal vertebræ happened in this body to be the deep cervical artery,—a variety which has been shewn in a former part of this work (page 180) to be no very unusual occurrence. The posterior branch of the first lumbar artery is marked ^{9†}; and the first of the corresponding branches from the sacral arteries which escape backwards through the posterior foramina of the sacrum, bears the mark ^{12†}.

Beyond the proper posterior branches of the intercostal arteries, or at a greater distance from the spinal column, there are observable other branches, which proceed from the anterior division of the same arteries. These are much less regular than the arteries already described; one of the series is marked thus, ^{8‡}.

The Nerves.—The posterior roots of the spinal nerves are displayed, except those of the first two, which were concealed by the dura mater. All the nerves were divided at or close to the point of exit from the canal, except those forming the sacral plexus, of which a larger portion has been left.—The same nerves (sacral) were held forward against the sides of the vertebræ while the drawing was in preparation.

Figure 2.—The brain and spinal cord from the body of an adult male are represented in this drawing to show the arteries atthe base of the brain and the anterior spinal.

The anterior spinal artery runs the whole length of the spinal cord, in contact with its anterior surface. It is made up of offsets from several arteries. The first or highest are the branches from the vertebral; the others enter at several and varying points to reinforce and maintain the artery to the end, and they emanate from the spinal arteries of the preceding figure.

The anterior spinal artery may have nearly equal thickness in its whole length; or it may be found to diminish very much at any point, and then a reinforcing branch, entering through an intervertebral foramen, divides on the cord into an ascending and a descending branch, which join respectively with those above and below. It is when one or more inequalities of this kind exist that the little artery most clearly appears to result from the junction of several branches.

Figure 3.—In the preceding figures the arteries which enter the spinal canal at various points, have been seen to furnish branches to the spinal cord. The branches which ramify from the same source over the vertebræ are here illustrated. The arches having been removed from three lumbar vertebræ, the bodies are seen from behind, and the small arteries ramifying on them are displayed. It will be observed, that each branch joins with one from the artery below, and with another from that above it. This occurs equally on both sides, and there are thus formed two series of free arterial anastomosis along the interior of the spinal canal; and at the same time one lateral series is brought into communication with the other by transverse branches having more or less regularity.—It may be mentioned, that in the corresponding veins, which are very large, a somewhat similar arrangement can be recognised.

The remaining figures of the plate illustrate some of the peculiarities of the arteries at the base of the brain,—viz., the two vertebral and two internal carotid arteries, with the connexion established between the four arteries constituting what is generally known as the "Circle of Willis."

Figure 4.—There are here three deviations from the arrangement shewn in the second figure. *a*. One of the vertebral arteries is much smaller than the other.* *b*. The posterior cerebral artery of one side is derived from the carotid. *c*. A small "aberrant" branch is connected with the basilar.

Figure 5.—The peculiarity in this case consists in the absence of one of the anterior cerebral arteries. In its place slender branches form a communication between the single

* We are indebted to Dr. Davy for some interesting observations on the vertebral and basilar arteries. On comparing the vertebral arteries one with the other in 98 bodies, this observer found that the left was larger than the right in 28, while the number of those in which the right exceeded the left in size amounted only to 8. He likewise observed that, in three of the cases each vertebral was as large as the basilar—this being of the usual size. There was no disease in the vertebral arteries in these cases. Dr. Davy in two instances discovered "an opening or foramen between the two vertebral arteries, in the septum formed by their juxtaposition posterior to the basilar artery. In each instance it was sufficiently large to admit a surgeon's probe.' —"Researches," &c., by John Davy, M.D. Vol. I. page 304. London, 1839.

anterior cerebral artery and the internal carotid of the opposite side. It is an example of a very rare variety. The figure has been copied from M. Arnold.*

Figures 6 and 7, which represent different parts of the same case, exhibit a very singular variety of the arteries. In the first of the figures the vessels remain in connexion with a part of the skull, and the internal carotid of the right side has been extensively brought into view by cutting out a portion of the bones. The following is the peculiarity in the conformation of the vessels.—A large branch of the left internal carotid [3f] turns backwards, and after perforating the basilar part of the sphenoid bone joins with the basilar artery, as shown in figure 7, forming, in fact, the anterior part of that artery.

The preparations from which the figures have been taken are in the Macartney collection in the Anatomical Museum of Cambridge. The drawings were, with much kindness, made for this work by Professor Clarke.

Figure 8.—This sketch is introduced to shew a small foramen in the basilar artery.†

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a Digastric muscle.
b Occiput stripped of skin and muscle.
c Submaxillary gland.
d Dura mater of the spinal canal slit open and turned outwards. Part of this membrane was removed along the canal.
e Thyroid cartilage.
f Heart.

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* "Bemerkungen über den Bau des Ruckenmarks, &c., von Dr. Friedrich Arnold," Taf. 2.—Zurich, 1838.

† An example of similar perforation of the artery is preserved in Professor Otto's Museum at Breslau. The foramen in this case gave passage to a small vein. See "Neues Verzeichniss der Anatomischen Sammlung," &c. S. 25,—2001. Breslau, 1838.

In the basilar artery Dr. Davy discovered a peculiar structure, which he thus describes in the essay before referred to:—"It is a band in the interior of the vessel attached to its sides, and consequently, intersecting it. It varies both in its dimensions and situation. I have most frequently found it near the junction of the vertebral arteries; very seldom near the Circle of Willis. Sometimes the band perfectly intersects the vessel; at other times only partially. Sometimes I have seen it not more than a line thick; occasionally two or three lines. Its appearance, as regards its nature, has always been similar and most analogous to a fibrous structure. In every instance, I apprehend, it may be considered as congenital and not the effect of disease. This is inferred after careful examination to endeavour to detect the effects of diseased action." Among 98 bodies in which the basilar artery was carefully examined by Dr. Davy, the peculiar structure was present in 17.—"Researches," &c. v. 1, p. 301.

ARTERIES.

1. Aorta.
1†. Internal iliac.
2. Pulmonary.
3. Common carotid.
3a. Internal carotid.
3b. Posterior communicating.
3c. Middle cerebral.
3d. Anterior cerebral.
3e. Anterior communicating.
3f. A large unusual branch of the internal carotid, perforating the basilar part of the sphenoid bone, and joining with the basilar artery.
4. Subclavian.
5. Vertebral.
5¹. A small vertebral.
5a. Inferior cerebellar.
5b. Anterior cerebellar.
5c. Basilar.
5d. Superior cerebellar.
5e. Posterior cerebral.
5f. Anterior spinal.
6. Inferior thyroid.
7. A small branch of subclavian destined for the nerves and spinal canal.
8. Intercostal (first aortic).
8¹. Deep cervical,—a branch of the superior intercostal derived from the subclavian. This artery is here in an unusual position, being below the first rib instead of above that bone.
8†. Posterior branch of an aortic intercostal. The branches of the same kind from the other intercostal arteries, as they range with this, are not indicated by special marks.
8‡. A branch derived from the anterior intercostal. There are a few similar branches below this.
9. First lumbar.
9†. Its posterior branch.
9‡. Spinal branch of the last, ramifying on the bodies of the vertebræ (the posterior surface of the bodies).
10. Ilio-lumbar—lumbar part. The iliac and lumbar parts of the artery are separate in this instance.
11. Happens to have been omitted from the drawing.
12. Lateral sacral.
12†. Posterior branch of same (the first of a series), after penetrating through the highest of the posterior foramina of the sacrum.

FEMORAL ARTERIES.

Most anatomical writers describe under the name "femoral" the artery between Poupart's ligament and the large opening of the adductor magnus by which it passes to the popliteal space; and they regard the great muscular or nutritious artery of the thigh as a deep branch of the femoral, commonly designating it by the Latin words "profunda femoris." Some authors make distinction in name between the vessel before the origin of the deep branch and after it is given off. Thus, Murray* named the short trunk continuing

* Adolphi Murray, Descriptio Arteriarum, corp. humani in tab. redacta." Ed. altera p. 126. Lipsiæ, 1794.

Barclay describes all the vessel, from Poupart's ligament to the lower end of the popliteal space, as the "Arteria cruralis," and he subdivides it into three portions, as follows:—the part from the boundary line of the external iliac to the origin of the deep femoral, or cruri-inguinalis; the femoral portion, or cruri-femoralis; and the popliteal, or cruri-poplitcal.—"A Description of the Arteries," &c., 2 Edit. Edinburgh, 1820.

the external iliac artery, "common femoral"*; and the two into which it separates, that anatomist recognised as the "superficial femoral" and "deep femoral" arteries. This is a convenient manner of specifying the parts of the vessel which may be referred to, and accordingly it is often used, even where no formal distinction is made between the main artery above and below the origin of the deep branch.

The arteries of the fore part of the thigh are represented in the manner of their most frequent disposition in plate 69; and they are shewn in connexion with veins and nerves in plate 70; and in plates 71 and 73, the first figure of each.

The observations on these arteries will have reference to the peculiarities of the trunk of the femoral: its various branches: and some peculiarities of practical importance occurring in the veins, nerves, and muscles in the neighbourhood of the vessels.

A.—PECULIARITIES OF THE TRUNK OF THE FEMORAL ARTERY.

Double femoral—premature division.—Exclusively of the variations that occur in the place at which it gives rise to the "deep femoral," and the occasional origin from it of branches usually derived from another source (circumstances to be afterwards noticed), the deviations from the ordinary disposition observed in the main artery are exceedingly rare and few in kind. In this respect this artery contrasts strongly with that of the upper limb. The latter has been seen to divide very frequently above the ordinary position, (in the axilla or in the upper arm), while the femoral artery, on the contrary, is so little liable to change of this kind, that I have not hitherto met with an example. A case is mentioned by Sandifort,† in which the femoral artery of the right side is said to have divided at its commencement into two parts,

* This part was described separately long before the time of Murray. "As soon," says Cheselden, "as the great artery is passed out of the abdomen into the groin, it is called inguinalis, and in the thigh cruralis," &c. "The Anat. of the Human Body," 4th ed. London, 1730.

† "In latere dextro alius cadaveris femoralis arteria, mox atque ad artum hunc pertingebat, se findebat in duas æquales arterias, dum in sinistro latere divisio hæc, ut semper solet, in proplite (? poplite) conspiciebatur."
Ed. Sandifort. "Observat. Anatom. pathol." Lib. 4, cap. 8, p. 97.

whereas the division of the vessel in the left limb occurred at the usual position. From his account of the case it is to be inferred, that in this instance there were two arteries in the place of the usually single femoral and popliteal; it must however be added, that the statement would have been much more satisfactory if it had been more full and circumstantial.

Early division of the femoral artery is likewise referred to by Portal *, who, however, speaks merely in general terms, and does not allude to any case occurring under his own observation. Gooch too states, that in amputating the thigh he had, in three cases, found the femoral artery double; but, as there is no mention of the state of the popliteal, it cannot be determined whether these cases were examples of high separation of the arteries of the leg, or of division and reunion of the superficial femoral; and in the absence of positive evidence, it seems most reasonable to consider them examples of the latter arrangement, which is less infrequent in its occurrence. They will, therefore, be noticed again in the class of cases which come next under observation.

Double femoral—division and reunion of the parts.—Though the premature division of the main artery into those destined to supply the lower part of the limb, so common in the arm, is of exceedingly rare occurrence in the thigh, the examples of separation of the trunk into two parts, which again reunite, is as often, or more properly with equal infrequency, met with in the one limb as the other.

An example of this peculiarity is represented in plate 71, figure 2. It will be observed, that the femoral artery divides below the origin of the "profunda" into two equal parts, and that these again unite above the opening in the adductor magnus muscle by which the vessels enter the popliteal space. I have met with only a single example of this variation—that from which the drawing has been taken. None other occurred in the bodies noticed in the table, and I

* "Car on a vu l'artère crurale se diviser en deux grosses branches, peu après sa sortie du bas-ventre, et alors il y avait deux artères poplitées, tandisqu' on a vu dans d'autres sujets l'artère poplitée se prolonger très-bas sur la jambe, avant de fournir les tibiales."—"Cours d'Anat. Médicale," T. 3. P. 326—3e. ed. Paris, 1803.

can state it to be the only one present in nearly twelve hundred bodies. I am, however, acquainted with three other cases * in which the conformation of the vessels was exactly similar. Two of these observed—the one by Sir C. Bell †, the other by Mr. Houston ‡—are already placed on record; the third was in the possession of the late Mr. Tyrrell, and has not I believe been hitherto noticed in print.§ With one exception, the examples of the peculiarity here referred to, occurred in the bodies of adults; the excepted case (Mr. Tyrrell's) was found in a full-grown fœtus.

* One of the preparations (that described by Mr. Houston) is in the Museum of the Dublin College of Surgeons; that mentioned as Mr. Tyrrell's, belongs to the Museum of St. Thomas's Hospital; the other two are in University College—one in the Museum of Human Anatomy, the other in my own collection.

† "A case of popliteal aneurism, in which the femoral artery was found to be divided into two trunks, which again became reunited where the vessel passes through the tendon of the triceps muscle. Treated at the Middlesex Hospital by Mr. C. Bell." —In "The London Medical and Physical Journal." Vol. 56, page 134. London, 1826.

‡ "Account of an unusual variety in the femoral artery, by John Houston," in "The Dublin Hospital Reports and Communications in Medicine and Surgery." Vol. 4, p. 313. Dublin, 1827.

§ It may be that the three cases which Gooch has recorded are referrible to the same arrangement of the arteries; but doubt exists, and must continue to exist, concerning their exact nature, in consequence of the absence of any statement of the condition of the vessels beyond the point at which they were divided in amputation, as the following extract shows:—

"In the case described in the preceding paper (on amputation of the thigh, 'by the single circular incision,') we observed a division of the femoral artery into two trunks of equal size, running parallel, and so near together, as that we could conveniently include them in one ligature with the needle avoiding the nerve, and after raising them up with the dissecting forceps by a small portion of the connecting cellular membrane. And here we found no occasion to take up any other vessel. This makes the third instance in amputations of the thigh, in which I have observed such a lusus naturæ in the arterial system; hence I am inclined to think it not improbable that this has often happened, though I do not find it noticed by any other surgeon." "Concerning aneurisms in the thigh, by Benjamin Gooch, Surgeon, at Norwich—Redde, May 19, 1775."—Philos. Trans., vol. 65.

In connexion with the statement that a double femoral artery was met with in amputating the thigh, and to show the necessity there may be for examination afterwards, in order to ascertain with certainty the condition of the arteries, the following case may be mentioned.—In an operation of this kind at which I was present several years ago, the surgeon finding, after he had secured what he believed to be the femoral artery, that, on the removal of pressure, florid blood flowed, or was jerked from another large vessel lying close to the one already tied, he placed a ligature on it likewise, and stated his belief that the femoral artery was double. The limb was afterwards dissected, and it then became manifest that the artery was single,—in fact that it had nothing unusual in its arrangement. It is probable that the vein (which at the lower part of the thigh has considerable thickness, and is at the same time held open by its connexion with the neighbouring fibrous structure) was included in one of the two ligatures. It may be added, that the patient did well; and he is now with an artificial limb, a very active person.

Sir C. Bell's case, the first recorded, has especial interest, because it was met with in an operation for popliteal aneurism, and it therefore calls for more detailed remark. The principal circumstances were briefly these. The patient was a black man, about 45 years of age. The aneurismal tumour was placed lower than usual, projecting between the heads of the gastrocnemius. It was observed that the pulsation of the tumour could be arrested by compression made at the groin, but that when the pressure was directed to the middle of the femoral artery, it did not affect the pulsation, and on this account the operator determined to tie the artery lower than usual. In other respects the operation was conducted in the usual way, and an artery (the only one exposed) was tied. The pulsation in the tumour ceased when the ligature was tied; but while the hand of the assistant, Mr. J. Shaw, was still on the tumour, the pulsation was restored, and on examination, after the lapse of a short time, it was nearly as distinct as before the operation. For two days the case made favourable progress; and on the morning of the third day the pulsation in the aneurism had ceased. The wound wore now an unhealthy appearance, the patient was feverish and troubled with cough; and, in eight days from the operation, he died. The dissection showed that the ligature had been applied to one of two parts, of which the femoral artery consisted, near its lower end—a short space above the reunion of the two; and the aneurism, which was situated on the popliteal artery close to its bifurcation, was fully consolidated. "The sartorius muscle, from end to end (the report says), was affected with inflammation of an erysipelatous character which had spread along the whole course of its sheath. The muscle itself was swollen, and tumid with serous effusion."

In contemplating the arrangement of the vessels presented in the class of cases now under observation, the question at once arises as to what course the surgeon ought to pursue in an operation, in the event of his having reason to believe, from circumstances such as those which occurred in the case just noticed, that blood flows through two channels into the aneurism:—ought he to remain satisfied with placing a

ligature on one, or would it be more prudent to seek (by dividing the layer of sheath which separates the two) and tie the second likewise? The answer to this question will depend on the extent to which the blood flowing through an aneurism must be diminished in order of effect a cure; for, it has long been established that the interruption of the whole of the current is not necessary to the attainment of that end. The result of the case above detailed suggests the conclusion, that the decrease of the blood circulating through the aneurism to the extent of one-half, or rather of less that half, would render efficient the process which, in cases of aneurism, may be said to be already in progress, though with inadequate force. But this inference suffers abatement, inasmuch as the inflammation which occurred in the site of the vessel may have had some influence in determining the consolidation of the aneurism.

B.—BRANCHES OF THE FEMORAL ARTERY.

The branches will be examined in the following order—1. Several small branches which only require brief notice, and will be placed together; 2. the deep femoral; 3. the anastomotic branch; lastly, 4. some unusual branches, or branches transferred to the femoral, which ordinarily have a different place of origin.

1.—*Small branches.*—With the exception of the deep femoral and anastomotic, the branches usually furnished by the femoral artery are small in size, and do not require detailed notice by reason of any practical importance in reference to operative surgery. They may be divided into two series; one of these, from the place of origin, is named inguinal, the other consists of branches distributed from the whole length of the parent vessel to the neighbouring muscles.

Inguinal branches.—These have usually considerable length, and they are distributed, for the most part, to the integument. From their position, with regard to larger branches and their destination, they are named, respectively, external pudic (of which there are two), external epigastric, and external or superficial circumflex iliac. The inguinal branches are repre-

sented in plates 69 and 70. Some of the veins likewise are shewn in the latter plate.

Small muscular branches.—We place under this head the short and usually small offsets of the superficial femoral trunk arising between the deep femoral and the anastomotic arteries. Their number varies very much. The following is a statement of the numbers in a few of the cases included in the table in which they happened to be reckoned :—

One was present in 19 cases.	Four or five were present in 9 cases.
Two ,, in 34 ,,	Seven ,, in 2 ,,
Three ,, in 17 ,,	

The size of these muscular branches usually diminishes with the increase of their number, and some proportion is observable between their size and that of the branches given from the external circumflex to the vastus internus muscle. Should the latter be small, the muscular branches are proportionally enlarged. There does not appear to be any correspondence between the two sides of the body with reference to these little arteries; in one body seven having been counted on one side, while but two existed on the other.

The inguinal and the muscular branches now briefly noticed are, with one exception, seldom and little interested in a surgical operation. The branch excepted from this general statement is the more superficial of the two external pudic, which is often divided in an operation for strangulated scrotal hernia. When divided, it seldom requires a ligature for the arrest of hæmorrhage. Indeed, arteries of the size of those now under consideration, when cut at some distance from their source, soon contract, and hæmorrhage, for the most part, speedily ceases. But if such a branch should happen to be divided at or very close to its origin, blood is impelled through it with as much force as if an opening of the size of the divided branch were made in the large artery from which it springs. From this fact it is an obvious practical inference, that in exposing the femoral artery for the application of a ligature, the knife should be sparingly and cautiously used to strip the vessel of any part of its sheath, for, besides the risk of depriving the vessel, to any extent,

of its nutritious arteries, the operator is liable to be embarrassed by the hæmorrhage consequent on the division of one of the branches in question. I have had occasion to witness this inconvenience in an operation for tying the femoral artery, which had been rendered necessary by the occurrence of secondary hæmorrhage after amputation. When the operation was nearly ended, a jet of blood issued with great force from a small branch divided near its origin, and the little vessel was secured, not without considerable trouble. In such cases the bleeding vessel ought, if practicable, to be tied; if this cannot be accomplished, it may be necessary to secure the main artery above and below the origin of the branch.

The remarks now made concerning the effect of dividing the small branches of the femoral artery, will, of course, equally apply to those of other large arteries.

2.—THE DEEP FEMORAL ARTERY.

This great artery (arteria profunda femoris) the principal nutritious vessel of the thigh (plate 69) is the most important of the branches of the femoral; and some points in its anatomy require careful investigation. I will first notice the place of its origin, and then examine its branches—which are large and numerous.

Origin.—The side of the femoral artery from which the large branch springs requires a brief notice before entering on the more important subject of the position in the limb, or the height at which the origin occurs. The deep femoral may be shortly said to arise from any part of the circumference of the main artery, except the fore-part, but not with equal frequency on different sides. Notes have been made with respect to this point in eighty-two of the cases in the Table, and the following is the result obtained:—

The deep femoral arose from the femoral

on the outer or posterior and outer side as exemplified in plate 69 and 71, fig. 1	in 55
on the inner or posterior and inner side (plate 73) . .	in 16
on the back part (plate 72, fig. 5, and 73, fig. 5) . .	in 11
	82

It is thus evident that the profunda arises most frequently on or towards the outer side of the femoral; and it is to be observed that when it departs from this position, the external circumflex, or a portion of this artery, is, in most instances, not derived from it. See the illustrations already referred to, especially plate 73.

The position the origin of this artery bears in the thigh, or its height, is a subject of much practical importance, because it, in a great measure, determines the situation at which the femoral artery may, with least danger, be tied for the cure of aneurism. With the view of ascertaining the point with some degree of accuracy, the distance between the place of origin and the lower margin of Poupart's ligament (which was taken as the line of demarcation between the iliac and the femoral parts of the arterial trunk) was measured in several cases. The details of this examination are contained in the Table (page 475, and seq.), and the following is an abstract of it:—

The entire number noted in the Table		431
The deep femoral arose		
above Poupart's ligament—from the Ex. iliac (plate 72, fig. 3)	1	
under that structure (plate 72, fig. 4)	7	
below it, ½ inch and less (pl. 73, fig. 2 and 3) . . .	13	
more than ½, not exceeding 1 inch (pl. 74, fig. 5) (those measuring 1 inch, being 65 of the number)	86	
more than 1, not exceeding 1½ (pl. 73, fig. 1, 4 & 5, pl. 74, fig. 4)	183	
more than 1½, not exceeding 2 (pl. 72, fig. 6, pl. 74, fig. 3)	109	
more than 2, not exceeding 2½ (pl. 73, fig. 6) .	19	
more than 2, not exceeding 3	12	
4 inches (pl. 72, fig. 5)	1	
	431	

Thus, in about three-fourths of all the cases (351 in 431) the origin of the deep femoral was from one inch to two inches, both these points included, distant from Poupart's ligament; and this may be said to be its usual position.

If to the fact now stated—namely, that the large branch under consideration commonly takes its rise between one and two inches below Poupart's ligament,—it is added, that the

epigastric and circumflex iliac arteries usually take their rise close above that structure, it is obvious that the application of a ligature to the common femoral artery must be attended with considerable risk. And when it is further considered that the free space between the branches is often lessened by their approximation (the one ascending or the other descending*), or by the transfer to the main trunk of a branch or branches usually proceeding from a different source (*e. g.* the circumflex arteries), the risk of the operation must be held to be much augmented. The inference which is here drawn from the arrangement of the vessels is fully borne out by experience, the results of the cases in which the operation has been performed being very unsuccessful.—In a case of secondary hæmorrhage occurring after amputation of the thigh, I have known the application of a ligature to the common femoral artery followed, after an interval of time, by renewal of hæmorrhage, which was permanently arrested by tying the external iliac. And the failure, in this instance, is by no means an exception to the general results of the operation. The history of several cases brought together by Mr. Hadwen† (two reported from his own observation, and others drawn from the published reports of different surgeons) show that but a very small proportion of all ended favourably.

Turning attention, in the next place, to the artery in the opposite direction, it will be found that the branches have little tendency to encroach upon the superficial femoral. The space between the origin of the profunda and the commencement of the trunk seldom exceeds two inches; the Table shews the proportion to be 32 in 431 cases. In but one of these did the distance reach beyond three inches; and in this single excepted case (No. 40 in the Table) the space between the points indicated measured four inches (see plate 72, figure 5). Where the deep femoral descends thus in any considerable degree beyond the ordinary place of its origin, it in most instances happens, that one or both the circumflex

* Ante, p. 457 and 460.

† "Medico-chirurgical Trans." Vol. 21, p. 328.

arteries (which are destined for the supply of parts close to the pelvis) arise from the common femoral. This fact is illustrated in the figure last referred to.

From the observations just made this practical inference is easily deduced : viz. that the point at which a ligature may be placed on the superficial femoral artery without risk arising from the position of branches, is little liable to vary.

BRANCHES OF THE DEEP FEMORAL ARTERY.

The deep femoral artery is, in fact, the common trunk of the principal arteries of the thigh : namely, the external circumflex, the internal circumflex, and the perforating branches (plate 69) ; and though one or even both the circumflex arteries should have a different source, the name "deep femoral," or "arteria profunda," is still applied to the residue —the common trunk of the perforating arteries. The branches springing from the profunda are liable to vary, and the variation affects the circumflex arteries only, as the subjoined abstract of cases noted in the Table shews :—

The number of the cases observed, amounts to		378
The deep femoral gave origin to all the branches, viz. both the circumflex and the perforating (plate 69) in	194	
In the remaining cases some branch had a different place of origin, and that specified in each statement, and it only was absent from the deep femoral.		
The external circumflex had a different place of origin (plate 73)	60	
Part of the extern. circumfl. (plate 73) . . .	31	
The internal circumflex (plate 74)	70	
Both the circumflex (plate 72, fig. 5 ; plate 73, fig. 6)	11	
The intern. circumfl. and part of the extern. circumfl.	12	
	—	184
		378

It results from these numbers, that all the branches took their rise from a common trunk (the deep femoral) in a little more than a majority of all the cases, and that this arrangement far exceeded in frequency any single departure from it. There can, therefore, be no hesitation in regarding it as the "usual" condition of the branches as to their place of origin.

THE EXTERNAL CIRCUMFLEX ARTERY.

This artery (plate 69) distributes branches on the fore part and outer side of the thigh—some ascending to the ilium, others descending towards the outer side of the knee, and a third portion is recognised as turning round the femur near its upper end. In the Table it is said to have been "usual," when it took origin as a single branch from the deep femoral; but there have been included under this head some cases in which the artery might have taken origin in separate parts from that source, for I did not always direct my attention to its division into parts arising separately from the profunda, especially in the earlier observations.

The deviations from the ordinary disposition may be arranged into two classes. The first will include the cases in which the origin of the artery is transferred from the deep femoral to the main artery, being still single at its commencement, as shown in plate 72, fig. 5, and 73, fig. 1.

The second class will comprise those wherein the branches, instead of arising as a single artery, are, from their commencement, independent one of the other, affording an example of premature division met with in many other arteries. This partition is commonly into two portions, in the manner of the cases represented in the fourth, fifth, and sixth figures of plate 73; I have, in a few instances, found the vessel separated into three distinct parts: an example is afforded by the third figure of the same plate. Among the cases referrible to this (second) class, there are several variations in the arrangement of the branches, as will appear in the annexed abstract of the Table.

ABSTRACT showing the peculiarities which occurred in the cases noted in the Table, and the proportion they bore in frequency to each other, and to the "usual" arrangement of the artery.

The external circumflex presented the usual arrangement (plate 69), in			255
A. It arose as a single offset from the femoral			
above the profunda (pl. 72, figs. 5 and 6; 73, fig. 1)	17	66	
opposite same	39		
below it	10		
B. It was represented by branches or parts arising separately in the following cases:—			
The parts were given from the profunda	17		
„ „ from the femoral (pl. 73, figs. 3 & 4)	6		
They arose, one from profunda, the other from femoral; and that from the latter was above profunda (pl. 73, fig. 5)	20	42	
the same was opposite profunda	4		
„ below it (pl. 73, fig. 2)	18		
They were connected with the internal circumflex, and above the profunda (pl. 73, fig. 6)	1		
They were given, one from the circumflex iliac, the other from the femoral (pl. 74, fig. 1)	1		
	—	67	
		— 133	
			388

When a part of the external circumflex took origin from the femoral artery, it is to be understood that in almost every instance it was that representing the descending branches, or one of them, which was transferred to the unusual source, in the manner delineated in plate 73, figures 2 & 5. Lastly, it should be stated concerning the descending branches, that instead of separating from the same stem, they sometimes take rise independently one of the other, as exemplified in plate 73, figures 3 & 4.

INTERNAL CIRCUMFLEX ARTERY.

This branch of the deep femoral artery runs backwards, between the muscles, to the posterior aspect of the thigh. Its commencement is shown in plate 69, the termination in plates 76, 77.

Origin.—The internal circumflex is liable to few deviations from the ordinary disposition, the most important and

most frequent being a change in the place of origin. The degree of change in this respect, in the cases detailed in the Table, and the frequency of its occurrence, may be thus abridged :—

	Instances.	
It had the usual place of origin and general arrangement in . . .		297
It arose from the femoral,		
and was placed above the profunda (pl. 72, figs. 5, 6) . .	49	
„ opposite or close to same artery . . .	38	
„ below it	3	
	—	90
from the epigastric (pl. 74, figs. 1 & 3). Only a single example occurred in the cases mentioned in the Table, but I have noted several others		1
from the circumflex iliac (two cases have fallen under my notice, one of which belonged to the Table), (pl. 74, fig. 5)		1
from the common femoral in connexion with the external circumflex (pl. 73, fig. 6)		1
	—	94
		391

I have likewise found this artery arise from the epigastric, the obturator being at the same time derived from that artery (plate 74, figure 4); from the obturator (this artery taking origin close to Poupart's ligament), plate 72, figure 4; and from the external iliac as an independent branch (plate 74, fig. 2).

Course.—When it springs from the deep femoral, the internal circumflex varies but very slightly and infrequently from its accustomed course backwards. In a few instances, in consequence of the origin being lower than usual, it was directed across the pectineus to gain the interval between that muscle and the psoas.

In the examples that I have seen of this artery taking origin from the femoral, and from the external iliac, it turned backwards to its destination, either directly or immediately after turning round the femoral vein (plate 73, figures 1, 3, 4); and in the event of a femoral hernia occurring with a like conformation of the vessel, and an operation becoming necessary to restore the protrusion, the vessel would not be endangered. But a different direction—inwards over the vein and "lymphatic sheath" (crural canal)—is assigned to it by Allan Burns,

and he has concluded that the artery would be endangered in the operation alluded to. *

The only other noticeable variation of this branch which has come under my observation, is a considerable decrease of size, and this occurred in a single instance.

The perforating branches. — These branches are shown in plate 69 and plates 76, 77. I have not made any observations as to the existence of peculiarities; if they are subject to any, they must be practically unimportant.

Unusual branch of the deep femoral. — The deep femoral artery ends in the muscles at the back part of the thigh, as seen in plate 77 already referred to, and in a small branch or branches which run close to the femur in the manner represented in the first figure of plate 79. M. Cassamayor found the end of the artery pursuing a very unusual course in the body of an adult male. After furnishing the perforating branches, the deep femoral continued along the inner side of the femoral vein to its back part, and having passed with the vein through the adductor magnus muscle, it was lost in the biceps (its short head) and the vastus externus.†

3.—THE ANASTOMOTIC ARTERY.

This branch of the femoral artery is represented at plate 78, figure 3. I have not looked for peculiarities of this artery, and I have not observed any other departure from the conformation indicated in the figure referred to except a diminution of size.

* "The arteria circumflexa interna, in a young subject which I examined about five months ago, originated from the external iliac artery above Poupart's ligament, and passed through the crural foramen in its way to the muscles about the top of the thigh. It ran along the front of the lymphatic sheath, so that had crural hernia taken place in this person, and had an operation been required, this artery would most probably have been divided; but, like the epigastric, when it rises from the femoral artery, it would have been easily secured." "Observations on the Diseases of the Heart, &c." p. 319. Edinburgh, 1809.

† "Nous avons nous-même, dans le cours de nos dissections, vu dans le cadavre d'un homme adulte, l'artère musculaire profonde, après avoir fourni trois grosses artères perforantes, aller le long du côté interne de la veine fémorale d'abord; puis, par derrière ce vaisseau, s'engager avec lui dans la gouttière aponeurotique du muscle grand adducteur pour se perdre en partie dans la courte portion du muscle biceps crural, en partie dans le tiers inférieur du muscle vaste externe."—"Essai sur l'artère fémorale, par J. A. L. Cassamayor." p. 43—Thèse, No. 151, Paris, 1825, in the "Collection de Thèses soutenues à la faculté de Médecine de Paris."

4.—UNUSUAL BRANCHES OF THE FEMORAL ARTERY.

Under this head are to be included the branches which, being usually given from other sources, happen, in some instances, to take origin from the femoral. As these arteries and their occasional connexion with the femoral, have been already noticed in other places, it becomes necessary in this place only to indicate them. They are as follows:—

On examining the description of these arteries respectively, it will appear that the three first-named are but rarely transferred from their usual place of origin to the femoral, whereas the last two frequently undergo that change.

C.—OF THE VEINS, NERVES, AND MUSCLES IN CONNEXION WITH THE FEMORAL ARTERY.

The veins connected with the femoral artery are the femoral: deep femoral: and long saphenous. See plate 70; and plates 71, and 73, the first figure of each.

The *femoral and deep femoral veins* are very close to the artery—separated from it only by a thin layer of membrane, a partition of the sheath of the vessels.

The *long saphenous* vein lies at some distance to the inner side of the femoral artery, except at the groin, where it inclines outwards to its termination, and it is seldom liable to be met with in an operation for placing a ligature on the artery. This remark especially applies to the upper part of the limb, where the artery is usually sought in that operation. But a superficial vein, which in many cases lies for some space over the artery, may be met with in the operation alluded to. From the frequency of its occurrence, as well as its size, and the position with respect to the artery (see plate 70), it may be well to direct attention to this vein by assigning to

it a name, and I would therefore distinguish it as the *accessory saphenous.*

Peculiarities of the veins.—I have in several instances found the femoral vein double, and some modifications or varieties of this state, which have come under my notice, may be briefly mentioned, as follows :—The vein was divided only for a short space, the parts lying side by side, and the artery over them, in the manner delineated in plate 75, figure 1 ; the divisions of the vein lay apart for a much greater length, and the artery was partially imbedded between them (figure 3 of the same plate); one of the parts of the double vein turned over the artery, as in the case represented in figure 2.

Small veins may be often observed to pass over the artery in various directions,—in transverse loops, as in figure 5 of the plate already referred to, or very obliquely (figure 4). These small branches most frequently are joined at both ends to an ordinary vein ; but in some instances they are found to connect the parts of a double femoral vein.

In the foregoing observations, the veins have been found of large size, and their connexion with the artery has been shown to be more than ordinarily intimate ; it remains to notice the opposite change. It sometimes happens that the femoral vein, or, more properly, the part accompanying the femoral artery, is much diminished in size. A form of this peculiarity is given in plate 80, figure 3. In cases of this kind the popliteal vein (tracing it upwards) instead of occupying the large foramen of the adductor magnus with the femoral artery, penetrates that muscle at a higher point with branches of the deep femoral artery, and joins with the deep femoral vein, which is in consequence much augmented in size. The femoral vein therefore gains its ordinary position for the first time at the groin, and the femoral artery from that point to the popliteal space is accompanied by only a small vein, or, as in the drawing referred to, by two small branches. In one instance I found this part of the artery without any vein in close connexion with it.*

* M. Velpeau, ("Nouveaux Elémens de Médecine Opératoire," Tom. 1, p. 159, Paris, 1832,) mentions a case in which the femoral vein, as in those above noticed,

Nerves.—The position the nerves bear with respect to the femoral artery is shown in plates 69, 70, and 71 figure 1. The only deviation from the ordinary arrangement of sufficient importance to be noticed in this work, which has come under my notice, is the following. The long saphenous nerve did not accompany the femoral artery; it was placed over the sartorius muscle, and took its usual position at the inner side of the knee. I met with this peculiarity in the course of the nerve, in the case marked No. 272 in the Table, on the right side of the body.

The Sartorius muscle.—The position of this muscle is of importance to the surgeon in an operation for popliteal aneurism (and it is the only one of the muscles to which the remark applies), from the circumstance of its being placed over a great part of the femoral artery. The point at which the sartorius begins to cover the vessel is in most instances about four inches distant, or a little more, from Poupart's ligament, measuring to the upper margin of the muscle; and, in general, it is not necessary to disturb it to any considerable extent in placing a ligature on the artery at the place usually selected for the operation (plates 70, and 71 figure 1). But in some cases it approaches and covers the artery considerably higher than the point indicated as the most frequent one, and this occasionally depends on the circumstance of the crest of the iliac bone being more than usually curved, or on the increased breadth of the muscle which coincides with large muscular development of the body; but it is commonly and chiefly due to the directness with which the muscle crosses the fore part of the thigh inwards. From the notes of several cases of this kind, written while they were before me, the following made respecting one (No. 47 in the Table) may be selected to elucidate the point in question. "The sartorius muscle on each side crosses the thigh more directly than usual, and

was distant from the artery in nearly its entire length—from the groin to the popliteal space; but its exact position between these two points is not stated. As far as the description goes, it would be inferred that the vein was on the same plane as the artery, not separated from it by muscles, in the manner of the cases in the text, for it is only said that "it formed a long arch, whose convexity looked towards the inner side of the thigh."

begins to cover the femoral vessels at not quite two inches' distance below Poupart's ligament. This is owing partly to great breadth of the muscle, but chiefly to its transverse direction. Its position is such, that even above the middle of the thigh it appears more easy to expose the artery by turning the sartorius inwards than in the opposite direction." For illustration of the fact here set forth, see plate 74, figure 4, and compare it with the other plates previously referred to.

POPLITEAL ARTERIES.

The observations on the popliteal artery will include:—*a*, some account of its usual disposition, and of the ordinary manner of its connexion with veins and nerves; *b*, the variations of the trunk from the usual arrangement; *c*, reference to the branches; *d*, remarks on the veins, nerves, and muscles in the neighbourhood of the artery.

A.—In the Table (page 490, et seq.) the popliteal artery is said to have had the "usual" arrangement when it continued as a single undivided trunk in its whole length, from the opening in the adductor magnus muscle to the lower margin of the popliteus, and had the position with respect to veins and muscles, which is represented in plate 78, figure 1.

This artery is exposed only to a small extent, without the separation and removal of muscles, and accordingly to bring the upper part into view it is required to turn aside the semi-membranosus and semi-tendinosus muscles, as shown in plate 77; and to expose the lower part it is necessary to remove the muscles of the calf of the leg,—exemplified in plate 81, figure 2; the small extent of the vessel which may be seen, without disturbing those muscles, is shown in the first figure of the last-mentioned plate. By the removal of all the muscles covering it, the whole of the artery is at once displayed in plate 78, figure 2.

A portion of the popliteal artery in connexion with the veins and nerves, is represented in plate 78, figure 1. This is the position at which the vessel would be sought by the surgeon for the application of a ligature, if that operation should be considered desirable, and if a selection of the place should be

admissible. The intermuscular interval here occupied by the vessels and nerves is named the popliteal space. It is, as may be observed in the drawing, of small size, while the muscles remain in their natural position; but it admits of being much widened by relaxing and drawing apart the hamstring muscles. Before the division of the fascia the popliteal space is indicated only by a slight, narrow depression—see plate 76.

B.—PECULIARITIES OF THE TRUNK OF THE POPLITEAL ARTERY.

But few variations from the ordinary arrangement have been found to affect this artery. Those which claim attention are the following: viz., the presence of two arteries in the place of the single trunk—what may be termed double popliteal; a change in the place of division, and in the branches into which it divides; an alteration in position with respect to the accompanying vein.

Double popliteal artery.—In the event of the femoral artery dividing into the arteries of the leg (an example of which has been cited from Sandifort, at page 513), there would obviously be two popliteal arteries, or two arteries in place of the popliteal in its entire length. This, however, is a variety of so rare occurrence that the only recorded instance I am acquainted with is the single one now referred to. But the lower part of the artery is not unfrequently double from the knee-joint downwards; and the two vessels which represent it either lie close together (plate 79, figures 3 and 5), or they are separated one from the other by the popliteus muscle (figure 4). The peculiarity is the result of the early division of the main artery; and this leads to the next head of Inquiry:—

The division of the popliteal artery.—The place of division is, from time to time, found to be changed to a higher point, —opposite the middle of the knee-joint or the lower margin of the femur. In no instance have I seen it ascend beyond the position now stated; neither has an example of the artery dividing below the margin of the popliteus muscle hitherto fallen under my observation.

The branches into which the popliteal divides, are, in most cases, the anterior and the posterior tibial. In the Table a few instances are mentioned of the peroneal being substituted for the last-named artery, and this change took place when the posterior tibial was of very small size (plate 84, figure 2), and, more clearly, when this artery was altogether wanting (figure 3). The popliteal artery was observed in one case to divide at the same time into the three arteries of the leg (plate 79, figure 6).

In its position with respect to the vein and other neighbouring structures, the popliteal artery is very constant. One remarkable deviation, in this regard, is represented in plate 80, figure 1. The artery and the vein, it will be observed, have changed places, and it is manifest that the former, in this singular case, would have been more easily accessible than usual in an operation.

The frequency with which the variations of the popliteal artery hitherto noticed were met with in the cases set down in the Table, will appear from the subjoined abstract:—

It had the "usual" arrangement	210
The division occurred behind the lower margin of the femur, and the lower part of the vessel was double	10
The anterior tibial and peroneal arteries resulted from the division .	6
The anterior tibial, posterior tibial, and peroneal arose together from the popliteal	1

B.—THE BRANCHES OF THE POPLITEAL ARTERY.

Independently of the arteries into which it divides, the offsets from the popliteal artery are of moderate size. The muscular branches given above the knee are represented in plate 77, and some slender arteries which ramify beneath the integuments over the calf of the leg, are shown in the same drawing. The muscular branches below the knee (sural) will be found in plate 81, figure 2, and in other drawings. The articular branches, under different aspects, are represented in plate 78, figures 2 and 3, and plate 79, figure 1. The large arteries which spring from the end of the popliteal, will be described separately.

C.—PECULIARITIES OF THE VEINS, NERVES, AND MUSCLES IN THE NEIGHBOURHOOD OF THE POPLITEAL ARTERY.

Veins.—The popliteal artery is commonly accompanied by a large single vein, which may be said to be formed by the junction of the veins belonging to the anterior tibial and the posterior tibial arteries. The venæ comites, which are associated with each of these arteries, form respectively a single trunk, and from the union of the two thus constructed the popliteal vein results. But the two veins formed by the junction of the venæ comites of the tibial arteries may remain separate as far as the knee-joint, and then the lower part of the popliteal artery is accompanied by two veins. And the upper part of the artery may likewise have two veins in connexion with it, if the union between the tibial veins should be delayed still further. The former of these variations is often present. The latter—the more extensive departure from the usual disposition—is much more rare; one of several examples which I have met with has been delineated in plate 80, figure 2.

The conformation of the vein has been seen to vary, in the cases which have been referred to in the last paragraph. The course is likewise found to deviate from the accustomed direction, and it occurs as follows:—The popliteal vein, instead of passing with the artery through the adductor magnus, ascends behind it for some space, and after joining with branches of the deep femoral vein, penetrates the muscle considerably above the foramen occupied by the artery; and the large vein comes into contact with the femoral artery for the first time in the inguinal region, where the deep femoral vein with which it is identified usually terminates. This peculiarity has already been noticed in the observations on the femoral vein; indeed its most important practical bearing has reference to the femoral artery. An illustration, drawn from one of five cases which I have observed, is contained in the eightieth plate (figure 3).

Short or external saphenous vein.—The ordinary course of this vein is shown in plates 78 and 81—the first figure of

each. In most cases it ends at the popliteal space, in the way represented in these plates. I have, however, repeatedly seen it extend upwards considerably farther, and in such cases the manner of termination varied. Thus—it was found to turn over the inner side of the thigh at its middle, and join the long saphenous vein; again, it was observed to end by junction with a vein in one of the muscles (see plate 80, figure 3). A few examples of each of these peculiarities of the veins have come under my observation.

Nerves.—The nerves contiguous to the popliteal artery are delineated in their ordinary position with respect to the vessel, in plates 78 and 81. A small filament (derived from the obturator nerve) which rests on the surface of the artery at its upper part after accompanying it through the adductor magnus muscle, has not been preserved in the drawing. I have seen the internal popliteal nerve (posterior tibial) lie to the inner instead of the outer side of the artery in the popliteal space; the sciatic nerve had in this case, it should be added, divided into its two great parts at the margin of the pelvis.

Muscles.—An unusual band of muscular fibres was occasionally observed in close connexion with the artery at the lower part of the popliteal space. In every case which I have examined it extended from the femur (the line above one of its condyles) to the gastrocnemius, constituting a supplemental or third head to that muscle. But the disposition of this structure was found to vary in different cases. In one instance, arising above the outer condyle, and joining with the internal head of the gastrocnemius (plate 80, figure 5); in another, taking its rise above the inner condyle, and ending in the same part (inner head) of the gastrocnemius, after curving round the artery; and again extending from the inner line of the femur, and ending in a small tendon, which joined the middle of the large muscle on its under surface (plate 80, figure 4). I found this muscular slip between the artery and the vein in every instance, except that delineated in the figure last referred to.

By the word "usual," applied to the anterior tibial artery in the Table, it is implied that it had an average of size, which may be judged of by the drawings to be presently referred to; that it arose opposite the lower margin of the popliteus muscle, as shown in plate 78, figure 2; that, after reaching the fore part of the leg by turning in front of the interosseous membrane (the partition between the anterior and posterior parts of the limb), in the manner depicted in plate 79, figure 1, it lay along the leg, deeply placed between the muscles (plate 82); that it extended onward over the tarsus from the bend of the ankle to the space between the first two metatarsal bones (plate 83, figure 3),—in this part of its course assuming the name "dorsal artery of the foot;" and that penetrating between the bones just mentioned, it becomes united with the external plantar artery (plate 86, figure 3).

By the "usual" arrangement it is likewise implied that the artery furnished, with more or less regularity, the following branches, viz.:—The recurrent (plate 79, figure 1), the malleolar, tarsal, metatarsal (plate 84, figure 1), and digital branches for the first two toes (plate 86, figure 3), together with several unnamed short offsets to the contiguous muscles (plate 82).

It is, however, to be understood that slight deviations in the artery and especially in its branches, from the arrangement here set forth and represented in the plates, were not considered enough to exclude a case from the number of those marked "usual."

Peculiarities.—The principal deviations of the anterior tibial artery from the disposition above portrayed affect its origin: course: size: and the condition of the branches.

Origin.—The place at which the artery arises is sometimes raised above the ordinary position—from the lower margin of the popliteus muscle to the middle of the knee-joint or the end of the femur (plate 79, figures 3 & 4). And an alteration occasionally occurs in the artery with which it is conjoined at its origin. This change is sometimes met

with when the popliteal divides above the usual situation (plate 79, figure 5), and when the posterior tibial artery is much diminished in size or altogether wanting (plate 84, figures 2 & 3). In these cases the anterior tibial is conjoined with the peroneal.

The course of the anterior tibial artery is necessarily altered at its commencement when it arises above the usual position, inasmuch as, in this event, it must descend a certain space to gain the interosseous interval. Moreover, this short part of the artery is liable to vary in its direction; in one case it lies behind the popliteus muscle (plate 79, figure 3), in another it is insinuated between that muscle and the bone (figure 4).

At the lower part of the leg, the vessel in some instances deviates from the usual straight course over the tibia to the margin of the fibula (the external malleolus), and again gradually resumes its accustomed position on the tarsus (plate 85, figures 2 & 3); and I have observed it make an additional curve on the dorsum of the foot, in the manner of the dorsal artery of the foot in the case delineated in figure 4.

I have not had occasion to observe any more extensive deviations from the accustomed course, than is found in the preceding observations. But Pelletan * has given the details of a case, in which the artery coming forward between the muscles became superficial (covered only by the skin and fascia) from the middle of the leg downwards. The leading circumstances of this interesting case were briefly these:—A robust man, during forced exertion in walking, felt acute pain in the right leg and ankle, and a swelling, with ecchymosis, was formed about the lower third of the leg, opposite the interval between the bones. Arterial pulsation being distinct in the swelling, Pelletan at first apprehended the existence of aneurism; but having, on examination of the other limb, discovered that pulsation was distinct in it likewise in the same situation, he was led by this and some other circumstances to form a different conclusion on the nature

* "Clinique Chirurgicale," &c. p. 101. Paris, 1810.

of the case. The report adds, that the patient examined the legs of other persons of his household, and found evidence of the same arrangement of the vessel (pulsation) in one only—his own daughter, who, it is said, resembled him very much in other respects, as well as in the singular condition of the anterior tibial artery. M. Velpeau* appears to have met with two similar cases (the artery in each superficial at the lower part of the leg), and he states that in one of them the artery, instead of reaching the fore part of the leg by passing through the interosseous space, was directed forward round the outer side of the fibula, in company with the peroneal nerve.

Size.—From the more usual or standard size, which is sufficiently represented by the drawing (plate 82), a change is often discernible,—either an augmentation or decrease. The latter is the more frequent alteration.

When in any considerable degree augmented beyond the ordinary size, the anterior tibial makes up in one class of cases for the want of the anterior peroneal, and in other cases compensates for the defective size of the plantar part of the posterior tibial artery (plate 86, figure 5).

The degree in which this vessel falls short of the average size varies very much in different cases, and in proportion to the degree of the decrease it fails to furnish branches. Thus: in one instance being defective in what may be regarded a first degree, it fails to furnish digital branches, which, in this event, emanate from a different source (plate 86, figure 4). Degenerating still further, it ends in front of the ankle joint (plate 85, figure 4); or at the lower part of the leg (figure 5); and, in these circumstances, its place is taken by the anterior peroneal artery, which increases proportionally in size, and furnishes the dorsal artery of the foot. In such cases an anastomosis is usually established between the anterior tibial and the anterior peroneal, or a small recurrent branch of the latter (figure 4); but occasionally these arteries appear

* "Nouveaux Elémens de Médecine Opératoire," &c., Tom. 1, p. 137. Paris, 1837.

to be altogether unconnected one with another at this point (figure 5).

No example of a more defective anterior tibial artery than that delineated in plate 85, figure 5, has hitherto fallen under my notice. But Allan Burns states that he found it "in two subjects altogether wanting." And he adds—"its place was supplied by perforating twigs of the posterior tibial artery. The arteria peronea antica supplied its place on the dorsum of the foot."*

The proportion in which the peculiarities mentioned in the foregoing remarks occurred amongst the cases contained in the Table, will appear in the annexed abstract:—

The anterior tibial artery had the "usual" arrangement, or did not depart from it to any considerable extent	185
Origin.—The artery arose opposite the knee-joint and lay behind the popliteus muscle	1
Arising in the same position it passed under that muscle . . .	4
It was joined at the origin with the peroneal artery . . .	6
Course.—It was inclined out of the usual course at the lower end of the leg	8
Size.—Was larger than usual, and compensated for the diminished size of the posterior tibial	3
Was small, and the posterior tibial supplied the defect . . .	1
Was small, and the peroneal supplied the defect . . .	10

The principal peculiarities of the branches of this artery have been incidentally noticed in the preceding remarks.

POSTERIOR TIBIAL ARTERIES.

The "usual" size and arrangement of the posterior tibial artery in its course along the leg are represented in plate 81, and its further distribution in the sole of the foot—as the plantar arteries—in plate 86, figures 1, 2, 3. The veins and nerves which accompany the artery are displayed in their usual relative position in the first figure of plate 83, and the nerves are more fully displayed in figures before referred to.

The deviations from the accustomed disposition which require notice are the following, viz.:—Change in the place of origin: alteration of size, and consequent variations of the

* A letter quoted by Dr. Barclay at page 267 of "A Description of the Arteries," &c. 2nd edit.

branches : a few peculiarities of the nerve and muscles in the neighbourhood of the vessel.

Origin.—Where the popliteal artery divides above the usual position, the origin of the posterior tibial is necessarily, and in the same degree, higher than usual (plate 79) ; and in some of these cases it is not associated with, or does not give origin to, the peroneal artery (figure 5 of that plate).

Size.—When augmented in any considerable degree, which seldom happens, it furnishes branches ordinarily derived from another artery:—as the digital branches, which commonly proceed from the anterior tibial artery (plate 86, figure 4), or an offset to take the place of a defective peroneal, as exemplified in plate 84, figure 4. A diminution of the size is not infrequent. Should this change occur in a moderate degree, a branch in aid of the defective posterior tibial may be derived from the peroneal, near the lower part of the leg. I have seen two such reinforcing branches ; one of these, as it crossed to join the tibial artery, lay over the deep muscles on the back of the leg, and the other was closely applied to the bone. A moderate degree of defect is, in some instances, supplied in a different manner, namely, by the anterior tibial artery, which, in such case, gives more than the accustomed number of digital branches. When the posterior tibial artery dwindles to a very small size, the peroneal artery usually sends a large branch to join it at the lower part of the leg (plate 84, figure 2); or (but this is much less frequent) the anterior tibial may be found to furnish the principal plantar artery and all the digital branches (plate 86, figure 5).

From the diminution of size we are led to the entire absence of the artery, which is not a rare variety. In every instance that I have observed the posterior tibial wanting, the peroneal took its place above the ankle (plate 84, figure 3) and had, from that point onwards, the distribution of the vessel whose place it occupied.

The nerve and the muscles, connected with the posterior tibial artery.—The position of the nerve is occasionally changed from the outer to the inner side of the artery at the lower part of the leg (plate 84, figure 2, and plate 85, figure 1).

As regards the muscles: the most important peculiarity consists in the addition of a thick muscular mass to the lower part of the soleus. The supplemental muscle lies along the inner side of the tendo Achillis, and is usually inserted into the os calcis by a special tendon in the manner exemplified in plate 85, figure 1; it covers the posterior tibial artery, and this is the point of most significance respecting it.—I have observed some variations of the plantaris muscle, which, though practically unimportant, may receive a brief notice. In one instance, the tendon terminated in the thick fascia or annular ligament, situated behind the inner malleolus (plate 84, figure 3); in another it was lost in the membrane immediately over the posterior tibial nerve at some distance above the ankle; in a third case, the little tendon was embedded in the substance of the tendo Achillis, near its posterior surface.

The frequency with which the peculiarities noticed above occurred among the cases in the Table, will appear in the subjoined abstract:—

The posterior tibial had the "usual" arrangement, or did not deviate from it in any considerable degree	185	
It was of diminished size, and was aided by the plantar branch of the anterior tibial artery	2	
Under same circumstances it was augmented by a moderate branch of the peroneal	2	21
,, by two branches of same	1	
Was of very small size, and was joined by a large branch of peroneal	7	
Was wanting, and peroneal furnished plantar arteries	11	
It was larger than usual, and gave all the digital arteries	1	
,, ,, and gave a branch which augmented the size of peroneal	2	

THE PERONEAL ARTERIES.

The ordinary disposition of the peroneal artery is represented in plates 81 and 83, the second figure of each.

The peculiarities of conformation to which it is liable consist in changes of the place of origin, and alterations of its size, and of the size of its branches.

The origin.—The peroneal artery springs from the posterior tibial artery, most frequently between the space of ½ inch and 1½ inch below the margin of the popliteus muscle. These

bounds are sometimes passed, and the artery is found arising two inches or more below the popliteus, or it ascends on the posterior tibial, step by step in different cases, till it reaches the end of the popliteal artery (plate 79, figures 2 and 6). The place of origin was marked in a few of the cases in the Table, with the following results:—

The peroneal arose from the popliteal artery at the margin of the popliteus muscle	1
,, from the posterior tibial less than ½ inch from same structure	1
,, ½ inch to 1½ inclusive, from same	21
,, more than 1½ inch, not exceeding 2 inches	5
,, more than 2 inches	1

The foregoing statement applies to the cases in which the popliteal artery has the usual place of division. Where that vessel divides prematurely, the peroneal is not invariable in its disposition: in one case it is seen to arise from the posterior tibial (plate 79, figures 3 and 4); in another, it is transferred to the anterior tibial (figure 5).

Size.—The peroneal artery is sometimes enlarged beyond the ordinary dimensions, and then compensates for the diminished size of one of the tibial arteries. Thus: the peroneal reinforces a small posterior tibial by a large branch at the lower part of the leg (plate 84, figure 2); or it takes the place of that artery when it happens to be altogether wanting (figure 3). In like manner the peroneal, by its anterior division, supplies the place of a defective anterior tibial at the lower part of the leg and on the foot (plate 85, figures 4 and 5). I have observed the peroneal artery reinforce at the same time both the tibial arteries.

Diminution of the size of the peroneal artery is of rare occurrence, in comparison with the opposite change. In a slight degree of diminution the anterior peroneal is wanting, and the anterior tibial furnishes a branch in its place; the decrease of size being more decided, the peroneal artery ends at the lower part of the leg, and a branch of the posterior tibial represents it on the outer side of the foot (plate 84, figure 4).

The great diminution of the size of this artery in the

case represented in figure 4, suggests the probability that the peroneal, like the posterior tibial, is sometimes wanting. Professor Otto possesses a preparation which is an example of this peculiarity.* I have not seen any similar case.

The subjoined abstract will show the principal peculiarities of the peroneal artery which occurred among the cases in the Table, and their proportionate frequency:—

The peroneal artery had the usual disposition		178
It was a little larger than usual, and gave a moderate branch to enlarge a defective posterior tibial	2	
gave two such branches	1	
Much enlarged, it compensated for the small size of the anterior tibial	6	
aided or took the place of the posterior tibial		17
aided the posterior and the anterior tibial at the same time .		1
It was smaller than usual;—its place in two of these cases was taken on the foot by the posterior tibial . . .	4	

The changes in the conformation of the arteries of the leg noticed in the preceding observations, whereby one compensates for the decrease or the absence of another, may be regarded as resulting from the enlargement of branches usually of small size—not from the addition of any new part. And the manner in which the peculiar condition is produced may be explained as follows:—First, as regards the posterior tibial and peroneal, which have been observed each in turn to reinforce the other. A communicating branch frequently extends between them, across the lower end of the tibia (in the manner delineated in plate 83, figure 2). And there occasionally occurs another branch (doubtless it always exists at an early period of growth), which lies over the deep muscles, and it likewise connects the large arteries in the same situation. Now, supposing the upper part of the posterior tibial artery to be of small size—inadequate for the circulation in the foot—and the peroneal with the superficial communicating branch to be augmented in size, the condition of the vessels exemplified in plate 84, figure 2, will be produced. Again: let the posterior tibial artery (its upper part as before) disappear, and the deep communicating branch with

* "Neues Verzeichniss der Anatomischen Sammlung," &c. Prep. 2093.

the peroneal be proportionally enlarged, the arrangement illustrated in figure 3 will result. But further: one of the short connecting branches, which have been represented as playing so important a part, may have its function reversed so as to convey assistance from the posterior tibial to the peroneal; and in this way the arrangement in the fourth figure of the same plate may be explained. For the upper part of the peroneal artery has dwindled, but its lower end receives blood from the transverse branch, which emanates here from the posterior tibial.

In like manner, should the anterior tibial artery be defective, the anterior peroneal (which is usually connected with it above the ankle-joint, see plate 84, figure 1,) being enlarged reinforces its lower end for the supply of blood to the foot; or, as the connexion with the anterior tibial is cut off, it may be said, in the usual way, that the anterior peroneal becomes the dorsal artery of the foot.

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THE END.

BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.